

Seminar on Reinsurance 2012

Aggregate Stop-Loss Covers

R^2

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Aggregate Stop-Loss Cover

- Motivation
 - Gap Filler (ie supplement to existing program)
 - AggStop on Net (Whole Acct)
 - Sideways Cat Cover (Frequency Protection)
 - Corridor, Backup Coverage (Agg on XoL)
 - Replacement for Traditional Cover
 - ASL v. QS – Capital Benefit without surrendering as much profit
 - ASL vs XoL – Addresses true risk better (Basis Risk)
 - Cat Capacity is constrained
 - Reserve Management - Adverse Development Cover (ADC)
 - Rating Agency
 - A.M. Best BCaR – Company-specific factors applied to SchP LoBs. Informally translates to a layer above ELR. ASL within this layer may help BCaR.
 - Lloyds ICA – Capital requirement “geared” to 1-in-200 Scenario.

Aggregate Stop-Loss Cover

- Design
 - Property Cat type Covers vs. Casualty/Whole Acct. (=Loss Ratio Covers)
 - In-the-money vs. Out-of-money
 - Single Year vs. Multi-Year
 - Retrospective (ADC) vs. Prospective
 - ASL Often “Structured” transactions
 - Aggregate limit itself may be considered a structure
 - Sublimits (Eg on Property Cat). Term Limits For multiyear deals
 - Funding via Experience Accounts
 - Residual EA returned as PC at commutation
 - Contractual interest credit
 - Funds Transferred vs. Funds Withheld
 - Single EA links years

Aggregate Stop-Loss Cover

- Design (cont'd)
 - Structured transactions (cont'd)
 - Additional Premiums
 - Loss Dependent – Post-Loss (Co-Insurance); Pre-Loss (No-Claims Bonus). Generally deposited to EA
 - Time-Dependent – Maintenance fees as additional margin. Encourages commutation. For Casualty covers, can reduce effective duration.
- Supply/Demand
 - Cat Capacity –
 - After major storms, cedants may consider agg covers for working cat layers or folding cat into whole acct. ASL. Generally reinsurers will want to sublimit.
 - Recent tornado activity – Frequency. Sideways cat protection becomes expensive
 - Interest Rates – Casualty ASL more difficult with low interest rates.

Examples - R² Insurance Co.

- \$1B Subject Net Earned Premium Income (SNEPI) – WC, Auto, GL, Commercial Property, HO
- Inuring XoL xs of \$500k casualty, 1M property; CAT xs of \$25M per occurrence.
- Base Example – Single year, Single premium ASL attaching 2-5 loss ratio points above “plan”. Margin = 25% of premium, remainder to funds transferred EA with interest rate = $r_f = 2\%$, PC=100% of residual EA - property, casualty, whole account, w\wo cat.
- Simulation to model individual lines of business (LoBs), large, attritional and cat losses, apply inuring re, payout patterns and contract terms.
- Outputs – Summary and percentile statistics, for NPV(R\I Loss), NPV(PC), NPV(R\I Income), Prob(Negative NPV), ERD, TVaR capital, return, leverage metrics. Expenses ignored.
- Return $r = r_f + \frac{E[NPV]}{C}$, where C is TVaR adjusted in some way for holding capital over time.

Examples - R² Insurance Co.

- **Funds Transferred:** R\I Income = Premium-Loss-PC
- **Funds WH:** R\I Income = Margin – “Net Paid”, where net paid is contracted loss paid after the EA is exhausted.
- NPV should be equal when EA credit rate = r_f .
- \$1B SNEPI is net of inuring re. Will keep this as exposure even if inuring is changed.
- Assume identical book for multiple years.
- Loss Modeling
 - **Property Cat** – use output of vendor models
 - **Casualty, Property non-cat LoBs:** See Below

R² Insurance Co. – Premiums and Losses

Premiums and Non-Cat Losses						
	SNEPI	Gross Non-CAT E[Loss]	Gross Non-CAT ELR	Ceded XoL	Net Non-CAT E[Loss]	Net Non-CAT ELR
WC	100,114,459	81,716,235	81.6%	5,285,100	76,431,135	76.3%
Auto	234,702,482	165,287,102	70.4%	2,723,900	162,563,202	69.3%
GL	313,449,903	189,134,014	60.3%	61,628,400	127,505,614	40.7%
CommProp	245,396,238	128,863,843	52.5%	20,688,450	108,175,393	44.1%
HOProp	106,336,919	54,234,199	51.0%	1,508,100	52,726,099	49.6%
	1,000,000,000	619,235,393	61.9%	91,833,950	527,401,443	52.7%
Casualty	648,266,844	436,137,351	67.3%	69,637,400	366,499,951	56.5%
Propery	351,733,156	183,098,042	52.1%	22,196,550	160,901,492	45.7%

Net Cat Losses				
Franchise	Net Cat E[Loss]	Net Cat ELR (% Prop. SNEPI)	Property ELR	Total ELR
-	59,402,346	16.9%	62.6%	58.7%
5,000,000	34,442,157	9.8%	55.5%	56.2%

R² Insurance Co. – Payout Patterns

Payout Patterns															
	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180
WC	17.0%	51.2%	66.5%	75.3%	80.6%	84.0%	86.5%	88.3%	89.7%	90.8%	92.6%	94.5%	96.3%	98.2%	100.0%
Auto	31.1%	63.2%	78.0%	88.4%	94.9%	98.0%	99.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
GL	6.6%	23.9%	41.6%	59.5%	73.6%	82.6%	88.0%	91.2%	93.2%	94.5%	95.6%	96.7%	97.8%	98.9%	100.0%
CommProp	46.1%	89.5%	94.7%	97.1%	98.5%	99.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HOProp	51.2%	92.7%	97.0%	98.4%	99.2%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cat	46.1%	89.5%	94.7%	97.1%	98.5%	99.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CASXoL	1.7%	11.7%	26.8%	45.9%	63.2%	75.1%	82.6%	87.1%	90.0%	91.9%	93.5%	95.1%	96.7%	98.4%	100.0%
PropXoL	31.3%	84.6%	92.2%	95.6%	97.8%	98.6%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

R² Insurance Co. – Inuring Re

- Casualty XoL: \$500k xs. \$500k for \$11m. Other coverage up to \$10m.
- Property Per Risk XoL: Coverage xs of \$1m
- Property Cat: \$25m xs \$25m per occurrence, 25% RoL, 1 reinstatement @100%. Other coverage up to \$200m.
- Assume no over-the-top or sideways exposure for XoL
- Cat has significant over-the-top, sideways exposure.

R² Insurance Co. Non-Cat Loss Model

- **Collective Risk Model with Mixed Poisson Claim Count. (MP CRM):**
 - For accident period i , LoB j , aggregate loss $Z_{ij} = X_{ij,1} + \dots + X_{ij,N_{ij}}$, $X_{ij,k}$ iid.
 - $N_{ij} \sim$ Mixed Poisson with contagion c_j . That is, $N_{ij} \sim \text{Poisson}[G_j \lambda_{ij}]$, where:
 - G_j is a random variable with mean 1 and variance c_j . G_j is the mixing distribution, c_j the contagion parameter. (Eg. Negative Binomial $G_j \sim \text{gamma}$)
 - Also, for AY i , LoB j , establish threshold $\tau_{ij} \leq \text{XoL attachment}$. Losses $\geq \tau_{ij}$ are “large”, losses $< \tau_{ij}$ are “small”.
 - Z_{ij}^L, Z_{ij}^S are also MP CRM with mixing distribution G_j .

R² Insurance Co. - Simulation Method

- **CAD Algorithm with Frequency, “Severity” and Serial Common Shock.** (Ref:Homer-Rosengarten (2011), Meyers-Klinker-LaLonde (2003))
- **Method for Z_{ij}** (Full info case – Have Ground-up F\S)
 - Draw from N_{ij} (i.e. draw from G_j and then from $\text{Poisson}[G_j\lambda_{ij}]$)
 - Draw N_{ij}^L from $\text{Bin}(N_{ij}, q)$, where $q = 1 - \text{CDF}_{X_{ij}}(\tau_{ij})$. $N_{ij}^S = N_{ij} - N_{ij}^L$.
 - Draw $X_{ij,1}^L, \dots, X_{ij,N_{ij}^L}^L$ large losses. $Z_{ij}^L = \sum_k X_{ij,k}^L$.
 - Draw \widetilde{Z}_{ij}^S from Conditional Aggregate Distribution (s. lognormal) matching k (= 2 or 3) moments of $Z_{ij}^S | N_{ij}^S$.
 - Deliver $\widetilde{Z}_{ij}^S, Z_{ij}^L, \langle N_{ij}^L, X_{ij,k}^L \rangle$.

R² Insurance Co. - Simulation Method

- Method de-emphasizes small loss severity; generates correct dependence relation between large and small losses.
- **Variant of Method** (Limited info case – No Ground-up F\S)
 - Draw from G_j only.
 - Draw N_{ij}^L from $\text{Poisson}[G_j \lambda_{ij}^L]$
 - Draw $X_{ij,1}^L, \dots, X_{ij,N_{ij}^L}^L$ large losses. $Z_{ij}^L = \sum X_{ij,k}^L$.
 - Draw \widetilde{Z}_{ij}^S from CAD matching first **two** moments of $Z_{ij}^S | G_j$.
- **Minimum parameterization for variant:** $G_j[c_j]$, $\lambda_{ij}^L = E(N_{ij}^L)$, (distribution of) X_{ij}^L , mean $\mu(Z_{ij})$, cv $\nu(Z_{ij})$.
- Can then eliminate severity from equations for first two moments of $Z_{ij}^S | G_j$.

R² Insurance Co. - Simulation Method

- Moreover, given all parameters except $v(Z_{ij})$ can show

$$\sqrt{c_j + \frac{\mu^2(z_{ij}^L)}{\mu^2(z_{ij})}(v^2(z_{ij}^L) - c_j)} \leq v(Z_{ij}) \leq \sqrt{c_j + \frac{\mu^2(z_{ij}^L)}{\mu^2(z_{ij})}(v^2(z_{ij}^L) - c_j) + \frac{\tau_{ij}}{\mu(z_{ij})}\left(1 - \frac{\mu(z_{ij}^L)}{\mu(z_{ij})}\right)},$$

- And any choice for $v(Z_{ij})$ within this interval is consistent with MP CRM.

R² Insurance Co. – Common Shock Correlation

- LoBs organized into covariance groups: $h(j)$ = covariance group for line j .
- Frequency CS acts through mixing distribution G_j .
- Form of G_j is “twisted product” $G_j[c_j] = G_{1j}[c_{1j}] \times G_{2j}[c_{2j}]$ defined by $G_j = G_{1j}G_{2j}[c_{2j}/G_{1j}]$
- G_{1j} is the industry component, G_{2j} is the line-specific component.
- Nice thing about twisted product is $c_j = c_{1j} + c_{2j}$
- **Parameter:** FrCoVarWt = w_j with $c_{1j} = w_j c_j$, $c_{2j} = (1 - w_j)c_j$ (varies by LoB)
- **Parameter:** SerialCoVarWt = $t_{h(j)}$ (varies by covariance group)

R² Insurance Co. – Common Shock Correlation

- G_{1j} correlates non-identical LoBs, both within-year and serially.
- G_{2j} - serial correlation for identical LoBs
- Specifically, for each AY i and LoB j draw uniforms $u_1(i, h(j))$, $u_2(i, j)$. That is, u_1 varies only by covariance group; u_2 varies by LoB.

$$\bullet u_1^*(i, h(j)) = \begin{cases} u_1(i, h(j)), & i = 1 \\ u_1(i - 1, h(j)), & i > 1, \text{ Prob} = t_{h(j)} \\ u_1(i, h(j)), & i > 1, \text{ Prob} = 1 - t_{h(j)} \end{cases}$$

$$\bullet u_2^*(i, j) = \begin{cases} u_1(i, j), & i = 1 \\ u_1(i - 1, j), & i > 1, \text{ Prob} = t_{h(j)} \\ u_1(i, j), & i > 1, \text{ Prob} = 1 - t_{h(j)} \end{cases}$$

R² Insurance Co. – Common Shock Correlation

- Now invert G_{1j} at u_1^* , G_{2j} at u_2^* .
- “Severity” common shock works similarly with parameter $SevCovarWt$, but through the conditional aggregate distribution. Assume CAD is lognormal with conditional parameters $Mu, Sigma$. Then CAD can be expressed as a product of lognormals:

$CAD =$

$$\text{logn}[\cdot 5Mu, Sigma\sqrt{SevCovarWt}] \text{logn}[\cdot 5Mu, Sigma\sqrt{1 - SevCovarWt}]$$

- Invert factors at (new versions of) u_1^* , u_2^* as above.

R² Insurance Co. – Loss Model Parameters

Year 1 Parameters For Non-Cat LoBs					
	WC	Auto	OtherCas	CommProp	HOProp
Large Loss Threshold	500,000	500,000	500,000	1,000,000	1,000,000
CoVarGroup	1	1	1	2	2
FrCoVarWt	0.15	0.35	0.50	0.50	0.50
ZSCoVarWt	0.50	0.50	0.50	0.50	0.50
SerialCovarWt	0.50			0.50	
c	0.05	0.05	0.05	0.05	0.05
G1 Distribution	Lognormal	Lognormal	Lognormal	Lognormal	Lognormal
G1shift	-	-	-	-	-
G2 Distribution	Lognormal	Lognormal	Lognormal	Lognormal	Lognormal
G2shift	-	-	-	-	-
Mean $\mu(\mathbf{Z})$	81,716,235	165,287,102	189,134,014	128,863,843	54,234,199
CV $v(\mathbf{Z})$	0.2500	0.2300	0.2470	0.2700	0.2600
Large Loss $\lambda(\mathbf{Z}^L)$	2.32	1.20	27.42	7.66	0.84
Large Loss Severity	Empirical	Empirical	Empirical	Empirical	Empirical
SevValues	500,000	500,000	500,000	1,000,000	1,000,000
	1,000,000	1,000,000	1,000,000	1,500,000	1,500,000
	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
	:	:	:	:	:
Sev Wts	25.00%	25.00%	25.00%	25.00%	25.00%
	20.00%	20.00%	20.00%	20.00%	20.00%
	5.00%	5.00%	5.00%	5.00%	5.00%
	22.45%	22.45%	22.45%	21.71%	28.46%
	:	:	:	:	:

R² Insurance Co. – Common Shock Correlation

ZS Correlation Matrix								
		Year 1						
		WC	Auto	GL	CommProp	HOProp	WC	Auto
Year 1	WC	1.00	0.24	0.28	-	-	0.50	0.11
	Auto	0.24	1.00	0.42	-	-	0.12	0.49
	GL	0.28	0.42	1.00	-	-	0.15	0.22
	CommProp	-	-	-	1.00	0.50	-	-
	HOProp	-	-	-	0.50	1.00	-	-
Year 2	WC	0.50	0.12	0.15	-	-	1.00	0.23
	Auto	0.11	0.49	0.22	-	-	0.23	1.00
	GL	0.14	0.22	0.50	-	-	0.28	0.42
	CommProp	-	-	-	0.50	0.25	-	-
	HOProp	-	-	-	0.25	0.50	-	-
Year 3	WC	0.25	0.07	0.08	-	-	0.52	0.12
	GL	0.05	0.26	0.11	-	-	0.11	0.51
	OtherCas	0.06	0.11	0.25	-	-	0.13	0.21
	CommProp	-	-	-	0.25	0.11	-	-
	HOProp	-	-	-	0.12	0.24	-	-

R² Insurance Co. – Common Shock Correlation

- Correlation only within covariance groups
- Serial correlation decays by SerialCoVarWt. (including WC, Auto)
- GL Correlates more than WC, Auto

R² Insurance Co. – Sensitivities

- **ELR pick by LoB** – highly levered effect, especially when attachment point near plan.
- **CV by Lob** (Parameter Risk?) – highly influenced by c parameters ($v \rightarrow \sqrt{c}$, see inequality from earlier slide)
- **FRCoVarWt, SerialCoVarWt** – influence total variation but less than CVs.
- **SevCoVarWt** – influence is less than other “covariance generators”.
- **Skewness** (Model Risk) – can change skewness using shift parameters of mixing distributions.
- **Payout variation** – can generate stochastic payout pattern via $P_t \mapsto P_t^U$, where P_t is the deterministic cumulative paid % at time t , and U is a uniform with mean 1.

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.1 – Property, Cat excluded, SNEPI = \$351.7m., Term = 1 yr.
 - ELR = 45.75%
 - Coverage Layer: 15% xs 48%
 - Premium: 7.5%*SNEPI, 25% of which is margin, the rest deposited to funds transferred (FT) EA.
 - EA Interest Credit = 2%.
 - PC = 100% of residual EA at commutation. Commutation at cedant option only if EA is sufficient to cover O\S loss.

Key Stats	
	EG1.1
NPV	3,192,779
Prob(Econ. Loss)	15.19%
TVaR(95)	(24,480,354)
TVaR(97.5)	(24,675,050)
r(TVaR(95))	8.24%
rTVaR(97.5))	8.19%
ERD	-8.58%

Commentary:

- Upfront cost (50% RoL) may be high for cedant.
- Prob(Econ. Loss.) may be high for R\I.

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG 1.1 Detail

Detail EG 1.1				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
Mean	26,379,987	9,087,488	14,099,719	3,192,779
St.Dev	-	15,323,478	8,263,663	8,401,204
Min	26,379,987	-	-	(24,710,017)
Max	26,379,987	51,090,004	19,784,990	6,594,998
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
1.0%	26,379,987	-	19,784,990	6,594,998
5.0%	26,379,987	-	19,784,990	6,594,997
10.0%	26,379,987	-	19,784,990	6,594,997
25.0%	26,379,987	-	19,784,990	6,594,997
50.0%	26,379,987	-	19,784,990	6,594,997
75.0%	26,379,987	13,859,532	5,928,013	6,594,997
80.0%	26,379,987	19,594,589	190,401	6,594,997
85.0%	26,379,987	26,750,842	-	(327,569)
90.0%	26,379,987	35,847,667	-	(9,467,681)
95.0%	26,379,987	50,246,492	-	(23,748,291)
99.0%	26,379,987	51,090,004	-	(24,710,017)
99.5%	26,379,987	51,090,004	-	(24,710,017)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.2 – Property Ex Cat, Term = 2 yr.
 - Coverage Layers: 10% xs. 48%, 5% xs. 63%
 - Deposit Prem. = 6.25%*SNEPI, Margin =17.5%*DP
 - Additional Prem. = 30% of contract loss excess of 10%*1-yr SNEPI (\$35.2m)
 - AP deposited to EA

Key Stats	
	EG1.2
NPV	5,011,987
Prob(Econ. Loss)	11.92%
TVaR(95)	(22,450,739)
TVaR(97.5)	(29,214,635)
r(TVaR(95))	11.10%
rTVaR(97.5))	8.99%
ERD	-2.85%

Commentary:

- Lower upfront cost and average ceded profit for cedant
- Div. benefit and slightly better downside protection for R\I
- ERD is lower

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG 1.2 Detail

Detail EG 1.2				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
Mean	44,850,119	16,467,786	23,370,346	5,011,987
St.Dev	3,503,674	22,951,238	14,930,070	7,487,858
Min	43,535,599	-	-	(37,755,884)
Max	63,422,359	101,178,244	35,916,869	7,618,731
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
1.0%	43,535,599	-	35,916,869	7,618,731
5.0%	43,535,599	-	35,916,869	7,618,731
10.0%	43,535,599	-	35,916,869	7,618,730
25.0%	43,535,599	-	35,916,869	7,618,730
50.0%	43,535,599	2,381,864	33,548,593	7,618,730
75.0%	43,535,599	29,984,274	5,955,725	7,618,730
80.0%	43,535,599	33,951,875	1,964,994	7,618,730
85.0%	45,908,044	41,037,233	-	4,951,365
90.0%	48,910,764	51,090,004	-	(2,390,253)
95.0%	53,478,979	66,714,652	-	(13,234,153)
99.0%	60,790,004	91,454,122	-	(30,279,607)
99.5%	63,422,359	100,453,040	-	(37,019,533)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.3 – Property Incl. Cat w\ \$5m Franchise, Term = 2 yr.
 - ELR = 55.5%
 - Ground-up contribution from cat. Limited to \$150m in the annual agg.
 - Coverage Layers: 10% xs. 58%, 5% xs. 73%
 - Deposit Prem. = 6.25%*SNEPI, Margin =17.5%*DP
 - Additional Prem. = 30% of contract loss excess of 10%*1-yr SNEPI (\$35.2m)
 - AP deposited to EA

Key Stats	
	EG1.3
NPV	4,823,955
Prob(Econ. Loss)	13.59%
TVaR(95)	(23,702,766)
TVaR(97.5)	(30,091,218)
r(TVaR(95))	10.36%
rTVaR(97.5))	8.59%
ERD	-3.00%

Commentary:

- Slightly less attractive to R\I than EG1.2 due to cat volatility.
- Can be less costly way to gain sideways cat protection for cedant

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.3 Detail

Detail EG 1.3				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
Mean	44,945,216	17,603,555	22,517,706	4,823,955
St.Dev	3,598,252	23,499,127	15,346,206	7,698,730
Min	43,535,599	-	-	(39,104,927)
Max	63,422,359	102,527,287	35,916,869	7,618,731
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(RI Income)
1.0%	43,535,599	-	35,916,869	7,618,731
5.0%	43,535,599	-	35,916,869	7,618,731
10.0%	43,535,599	-	35,916,869	7,618,730
25.0%	43,535,599	-	35,916,869	7,618,730
50.0%	43,535,599	3,607,549	32,309,683	7,618,730
75.0%	43,535,599	33,807,492	2,109,376	7,618,730
80.0%	43,535,599	34,910,928	1,038,779	7,618,730
85.0%	47,104,590	44,582,967	-	2,460,094
90.0%	48,507,289	51,090,004	-	(2,513,224)
95.0%	53,478,979	66,699,036	-	(13,214,679)
99.0%	60,936,707	92,248,467	-	(30,851,192)
99.5%	63,422,359	100,517,834	-	(37,075,056)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.4 – Property Incl. Cat w\ \$5m Franchise, Term = 2 yr.
 - \$25m xs 25m cat layer is dropped from cat program
 - Coverage A: As in EG1.3 with same DP and margin.
 - Coverage B: \$25m xs \$25m with \$50M annual agg. limit – inures to Cov. A.
 - Coverage B Prem. = 25% RoL, Margin = 20%.
 - Common EA, PC.
 - AP as in EG 1.3 except now depends on Cov. A + Cov. B loss.

Key Stats	
	EG1.4
NPV	6,137,181
Prob(Econ. Loss)	13.06%
TVaR(95)	(33,592,093)
TVaR(97.5)	(45,044,959)
r(TVaR(95))	10.15%
rTVaR(97.5))	8.08%
ERD	-3.22%

Commentary:

- Represents significant savings on 1st layer cat.
- R/I may also want term limit on Cov.A + Cov. B

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.4 Detail

Detail EG 1.4				
	NPV(Premium)	NPV(R/I Loss)	NPV(PC)	NPV(Income)
Mean	58,637,956	27,565,654	24,935,121	6,137,181
St.Dev	5,444,719	30,694,058	18,720,576	11,058,641
Min	55,913,050	-	-	(116,198,422)
Max	75,799,811	191,998,232	45,818,830	10,094,221
Percentile	NPV(Premium)	Npv(R/I Loss)	Npv(PC)	Npv(Income)
1.0%	55,913,050	-	45,818,830	10,094,221
5.0%	55,913,050	-	45,818,830	10,094,221
10.0%	55,913,050	-	45,818,830	10,094,221
25.0%	55,913,050	-	45,818,830	10,094,220
50.0%	55,913,050	20,209,800	25,618,849	10,094,220
75.0%	55,913,050	45,339,721	2,565,854	10,094,220
80.0%	61,406,961	51,539,631	-	9,808,521
85.0%	64,193,755	60,892,456	-	3,249,571
90.0%	67,952,158	73,828,090	-	(5,875,933)
95.0%	72,923,848	90,652,550	-	(17,653,549)
99.0%	75,799,811	120,854,203	-	(44,966,143)
99.5%	75,799,811	132,135,264	-	(56,236,445)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.5 – Casualty, SNEPI = \$648.3m ,Term = 1 yr.
 - ELR = 56.5%
 - Coverage: 15% xs 59%
 - Premium: 7.5%*SNEPI, Margin = 25%.

Key Stats	
	EG1.5
NPV	7,226,136
Prob(Econ. Loss)	12.99%
TVaR(95)	(38,415,380)
TVaR(97.5)	(39,922,655)
r(TVaR(95))	5.31%
rTVaR(97.5))	5.18%
ERD	-6.33%

Commentary:

- Returns depressed by longer duration, low investment yield

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.5 Detail

Detail EG 1.5				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	48,620,013	15,291,739	26,102,139	7,226,136
St.Dev	-	25,656,245	15,190,801	13,045,095
Min	48,620,013	-	-	(43,622,809)
Max	48,620,013	92,242,822	36,465,010	12,155,004
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	48,620,013	-	36,465,010	12,155,004
5.0%	48,620,013	-	36,465,010	12,155,004
10.0%	48,620,013	-	36,465,010	12,155,004
25.0%	48,620,013	-	36,465,010	12,155,003
50.0%	48,620,013	-	36,465,010	12,155,003
75.0%	48,620,013	24,988,565	11,493,729	12,155,003
80.0%	48,620,013	35,939,360	525,650	12,155,003
85.0%	48,620,013	42,773,273	-	5,875,995
90.0%	48,620,013	57,962,386	-	(9,342,373)
95.0%	48,620,013	82,657,490	-	(33,777,975)
99.0%	48,620,013	88,641,013	-	(40,007,954)
99.5%	48,620,013	89,419,886	-	(40,774,711)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.6 – Casualty, Term = **3 yrs.**
 - Coverage: 15% xs 59% annually, Term limit = 37.5% of 1-yr SNEPI
 - Deposit Premium: 5.5%*SNEPI, Margin = 25%.
 - AP: 50% of contract loss excess of 22.5% of 1-year SNEPI.
 - Maintenance Fees - Potential of four (4) annual payments of \$750k beginning in year 10 after inception, payable if deal remains open.
 - EA is **funds withheld** (FW), Interest credit = 3.5%

Key Stats	
	EG1.6
NPV	19,019,350
Prob(Econ. Loss)	12.03%
TVaR(95)	(47,640,359)
TVaR(97.5)	(56,545,196)
r(TVaR(95))	8.45%
rTVaR(97.5))	7.44%
ERD	-2.71%

Commentary:

- Spread of EA interest credit over risk-free rate helps due to long-tail nature of transaction.
- Could also add heavily funded layer below plan.
- Detail exhibit shows Margin – Net Paid

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.6 Detail

Detail EG 1.6				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	26,643,688	7,624,338	-	19,019,350
St.Dev	901,632	19,633,988	-	19,030,493
Min	26,220,101	-	-	(70,830,730)
Max	28,609,704	97,050,831	-	28,609,704
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	26,220,101	-	-	27,749,552
5.0%	26,220,101	-	-	26,220,101
10.0%	26,220,101	-	-	26,220,101
25.0%	26,220,101	-	-	26,220,101
50.0%	26,220,101	-	-	26,220,101
75.0%	26,220,101	-	-	26,220,101
80.0%	26,220,101	-	-	26,220,101
85.0%	28,609,704	12,282,277	-	16,408,342
90.0%	28,609,704	37,986,606	-	(9,376,902)
95.0%	28,609,704	59,577,198	-	(30,923,529)
99.0%	28,609,704	85,512,507	-	(58,315,343)
99.5%	28,609,704	89,292,816	-	(62,737,668)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.7 – Casualty, Term = **3 yrs.**
 - \$500k xs 500k dropped from XoL program.
 - Coverage: 15% xs 61%. All other terms as in EG 1.6
 - Attachment higher since \$500 xs \$500k no longer inures.

Key Stats	
	EG1.7
NPV	18,946,104
Prob(Econ. Loss)	12.05%
TVaR(95)	(47,664,878)
TVaR(97.5)	(56,415,537)
r(TVaR(95))	8.35%
rTVaR(97.5))	7.37%
ERD	-2.73%

Commentary:

- Savings by dropping “dollar-trading” XoL cover.
- Could also provide \$500 xs \$500 coverage as a separate section within ASL, and excess of a deductible.

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.7 Detail

Detail EG 1.7				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	26,647,487	7,701,383	-	18,946,104
St.Dev	905,654	19,701,399	-	19,097,446
Min	26,220,101	-	-	(70,576,729)
Max	28,609,704	96,796,829	-	28,609,704
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	26,220,101	-	-	27,442,014
5.0%	26,220,101	-	-	26,220,101
10.0%	26,220,101	-	-	26,220,101
25.0%	26,220,101	-	-	26,220,101
50.0%	26,220,101	-	-	26,220,101
75.0%	26,220,101	-	-	26,220,101
80.0%	26,220,101	-	-	26,220,101
85.0%	28,609,704	13,002,648	-	15,641,015
90.0%	28,609,704	38,276,293	-	(9,666,589)
95.0%	28,609,704	60,236,847	-	(31,590,562)
99.0%	28,609,704	85,095,575	-	(58,009,919)
99.5%	28,609,704	89,050,691	-	(62,690,656)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.8 – Whole Account Incl. Cat w\ \$5m Franchise, Term = 1 yr.
 - SNEPI = \$1B, ELR = 57.3%
 - Ground-up contribution from cat. Limited to \$200m in the annual agg
 - \$500k xs 500k dropped from XoL program
 - Coverage: 100% of 10% xs 60%, 50% of 5% xs. 75%
 - Premium: 6%*SNEPI, Margin = 25%, **Funds Withheld**
 - EA interest credit = 3.5%

Key Stats

	EG1.8
NPV	10,876,536
Prob(Econ. Loss)	10.02%
TVaR(95)	(32,993,150)
TVaR(97.5)	(39,604,307)
r(TVaR(95))	8.66%
rTVaR(97.5))	7.55%
ERD	-3.98%

Commentary:

- Loss share on layer 2 in lieu of AP.
- Funds withheld with spread of interest still effective.

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.8 Detail

Detail EG 1.8				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	26,647,487	7,701,383	-	18,946,104
St.Dev	905,654	19,701,399	-	19,097,446
Min	26,220,101	-	-	(70,576,729)
Max	28,609,704	96,796,829	-	28,609,704
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	26,220,101	-	-	27,442,014
5.0%	26,220,101	-	-	26,220,101
10.0%	26,220,101	-	-	26,220,101
25.0%	26,220,101	-	-	26,220,101
50.0%	26,220,101	-	-	26,220,101
75.0%	26,220,101	-	-	26,220,101
80.0%	26,220,101	-	-	26,220,101
85.0%	28,609,704	13,002,648	-	15,641,015
90.0%	28,609,704	38,276,293	-	(9,666,589)
95.0%	28,609,704	60,236,847	-	(31,590,562)
99.0%	28,609,704	85,095,575	-	(58,009,919)
99.5%	28,609,704	89,050,691	-	(62,690,656)

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.9 – Whole Account Incl. Cat w\ \$5m Franchise, Term = 3 yrs.
 - Ground-up contribution from cat. Limited to \$200m in the annual agg
 - Coverage 15% xs. 60%, Term Limit = 22.5% of 1-year SNEPI
 - Deposit Premium: 4.75%*SNEPI, Margin = 25%.
 - Maintenance Fees of \$1m incepting at year 10.
 - AP: 50% of contract loss excess of 22.5% of 1-year SNEPI.

Key Stats

	EG1.9
NPV	26,580,621
Prob(Econ. Loss)	8.71%
TVaR(95)	(73,560,025)
TVaR(97.5)	(92,980,341)
r(TVaR(95))	8.37%
rTVaR(97.5))	7.04%
ERD	-2.77%

Commentary:

- Lower deposit premium relative to similar EG1.6, EG1.7.

R² Insurance Co. – Example Group 1, Attach Near Plan

- EG1.9 Detail

Detail EG 1.9				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R/I Income)
Mean	35,408,668	8,828,048	-	26,580,621
St.Dev	1,130,637	27,053,253	-	26,205,107
Min	34,931,036	-	-	(131,325,550)
Max	38,117,173	167,871,670	-	38,117,173
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R/I Income)
1.0%	34,931,036	-	-	35,751,384
5.0%	34,931,036	-	-	34,931,036
10.0%	34,931,036	-	-	34,931,036
25.0%	34,931,036	-	-	34,931,036
50.0%	34,931,036	-	-	34,931,036
75.0%	34,931,036	-	-	34,931,036
80.0%	34,931,036	-	-	34,931,036
85.0%	36,555,647	-	-	34,931,036
90.0%	38,117,173	27,366,877	-	10,750,296
95.0%	38,117,173	80,568,651	-	(42,445,589)
99.0%	38,117,173	134,788,855	-	(96,013,947)
99.5%	38,117,173	147,241,063	-	(108,632,108)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.1 – Casualty, Term = 1 yrs
 - Coverage 100% of 10% xs. 70%, 50% of 10% xs 85%,
 - Premium: 2.5%*SNEPI, “No tears” (ie no EA, no PC)

Key Stats	
	EG2.1
NPV	13,641,009
Prob(Econ. Loss)	5.51%
TVaR(95)	(27,056,990)
TVaR(97.5)	(41,168,587)
r(TVaR(95))	8.31%
rTVaR(97.5))	6.15%
ERD	-8.39%

Commentary:

- Can at least consider “no tears” option because of higher attachment.
- Probably ceded profit too high for cedant, downside too high for R\I.

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.1 Detail

Detail EG 2.1				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	16,206,671	2,565,662	-	13,641,009
St.Dev	0	10,281,261	-	10,281,261
Min	16,206,671	-	-	(74,343,050)
Max	16,206,671	90,549,721	-	16,206,671
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	16,206,671	-	-	16,206,671
5.0%	16,206,671	-	-	16,206,671
10.0%	16,206,671	-	-	16,206,671
25.0%	16,206,671	-	-	16,206,671
50.0%	16,206,671	-	-	16,206,671
75.0%	16,206,671	-	-	16,206,671
80.0%	16,206,671	-	-	16,206,671
85.0%	16,206,671	-	-	16,206,671
90.0%	16,206,671	-	-	16,206,671
95.0%	16,206,671	19,159,293	-	(2,841,288)
99.0%	16,206,671	56,280,599	-	(40,053,805)
99.5%	16,206,671	59,544,155	-	(43,284,148)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.2 – Casualty, Term = 3 yrs
 - Coverage 10% xs. 70%, 5% xs 85%, Term Limit = 37.5%*1-yr SNEPI
 - Premium: 2.75%*SNEPI, Margin = 25%, **Funds transferred**
 - EA interest Credit = 2%
 - PC = **75%** of residual EA

Key Stats

	EG2.2
NPV	19,042,494
Prob(Econ. Loss)	5.25%
TVaR(95)	(35,492,870)
TVaR(97.5)	(61,585,080)
r(TVaR(95))	9.21%
rTVaR(97.5))	6.16%
ERD	-3.39%

Commentary:

- PC is expensive due to lower probability of attaching the cover.
- Thus reducing PC is effective.

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.2 Detail

Detail EG 2.2				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	52,440,202	7,784,373	25,613,335	19,042,494
St.Dev	0	22,298,188	9,100,665	15,023,640
Min	52,440,202	-	-	(164,787,361)
Max	52,440,202	217,227,562	29,497,613	22,942,588
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	52,440,202	-	29,497,613	22,942,588
5.0%	52,440,202	-	29,497,613	22,942,588
10.0%	52,440,202	-	29,497,613	22,942,588
25.0%	52,440,202	-	29,497,613	22,942,588
50.0%	52,440,202	-	29,497,613	22,942,588
75.0%	52,440,202	-	29,497,613	22,942,588
80.0%	52,440,202	476,750	29,140,051	22,823,401
85.0%	52,440,202	11,854,545	20,645,642	19,991,931
90.0%	52,440,202	30,946,410	6,287,806	15,205,986
95.0%	52,440,202	53,524,721	-	(1,031,434)
99.0%	52,440,202	110,717,180	-	(57,723,477)
99.5%	52,440,202	138,650,099	-	(86,062,191)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.3 – Property Incl. Cat w\ \$5m Franchise, Term = 1yr
 - Coverage: 100% of 10% xs. 71%, 50% of 10% xs 86%
 - Contribution from cat limited to \$150m
 - Premium: 2.0%*SNEPI, No tears

Key Stats

	EG2.3
NPV	5,004,560
Prob(Econ. Loss)	7.40%
TVaR(95)	(26,075,494)
TVaR(97.5)	(32,417,746)
r(TVaR(95))	9.02%
rTVaR(97.5))	7.65%
ERD	-20.37%

Commentary:

- Ceded profit high for cedant.
- Downside high for R\I

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.3 Detail

Detail EG 2.3				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	7,034,663	2,030,104	-	5,004,560
St.Dev	-	7,666,159	-	7,666,159
Min	7,034,663	-	-	(44,250,950)
Max	7,034,663	51,285,613	-	7,034,663
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	7,034,663	-	-	7,034,663
5.0%	7,034,663	-	-	7,034,663
10.0%	7,034,663	-	-	7,034,663
25.0%	7,034,663	-	-	7,034,663
50.0%	7,034,663	-	-	7,034,663
75.0%	7,034,663	-	-	7,034,663
80.0%	7,034,663	-	-	7,034,663
85.0%	7,034,663	-	-	7,034,663
90.0%	7,034,663	-	-	7,034,663
95.0%	7,034,663	18,792,400	-	(11,729,312)
99.0%	7,034,663	38,436,938	-	(31,395,734)
99.5%	7,034,663	48,364,202	-	(41,127,759)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.4 –Property Incl. Cat w\ \$5m Franchise, Term = 2yr
 - Coverage: 10% xs. 71%, 5% xs 86%
 - Contribution from cat limited to \$150m
 - Premium: 3.25%*SNEPI, Margin 17.5%
 - PC = **85%** of residual EA

Key Stats

	EG2.4
NPV	6,072,177
Prob(Econ. Loss)	8.04%
TVaR(95)	(22,137,897)
TVaR(97.5)	(31,918,163)
r(TVaR(95))	11.36%
rTVaR(97.5))	8.49%
ERD	-5.73%

Commentary:

- Reducing PC effective due to higher attachment.

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.4 Detail

Detail EG 2.4				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	22,638,511	4,013,482	12,552,852	6,072,177
St.Dev	0	11,494,505	4,607,816	7,625,023
Min	22,638,511	-	-	(78,230,513)
Max	22,638,511	100,869,024	14,432,051	8,206,460
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	22,638,511	-	14,432,051	8,206,460
5.0%	22,638,511	-	14,432,051	8,206,460
10.0%	22,638,511	-	14,432,051	8,206,460
25.0%	22,638,511	-	14,432,051	8,206,460
50.0%	22,638,511	-	14,432,051	8,206,460
75.0%	22,638,511	-	14,432,051	8,206,460
80.0%	22,638,511	-	14,432,051	8,206,460
85.0%	22,638,511	3,938,217	11,103,161	7,619,010
90.0%	22,638,511	16,858,714	102,144	5,677,653
95.0%	22,638,511	33,137,918	-	(10,498,370)
99.0%	22,638,511	51,048,011	-	(28,395,767)
99.5%	22,638,511	66,064,056	-	(43,378,904)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.5 – Whole Account Incl. Cat w\ \$5m Franchise, Term = 1yr.
 - Ground-up contribution from cat. Limited to \$200m in the annual agg
 - Coverage: 100% of 10% xs. 68%, 50% of 10% xs 83%
 - Premium: 2.25%, No Tears

Key Stats

	EG2.5
NPV	19,091,250
Prob(Econ. Loss)	5.44%
TVaR(95)	(34,668,325)
TVaR(97.5)	(54,958,061)
r(TVaR(95))	9.40%
rTVaR(97.5))	6.67%
ERD	-7.73%

Commentary:

- Ceded profit, R\I downside both high

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.5 Detail

Detail EG 2.5				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	22,500,000	3,408,750	-	19,091,250
St.Dev	-	13,805,666	-	13,805,666
Min	22,500,000	-	-	(117,035,228)
Max	22,500,000	139,535,228	-	22,500,000
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	22,500,000	-	-	22,500,000
5.0%	22,500,000	-	-	22,500,000
10.0%	22,500,000	-	-	22,500,000
25.0%	22,500,000	-	-	22,500,000
50.0%	22,500,000	-	-	22,500,000
75.0%	22,500,000	-	-	22,500,000
80.0%	22,500,000	-	-	22,500,000
85.0%	22,500,000	-	-	22,500,000
90.0%	22,500,000	-	-	22,500,000
95.0%	22,500,000	25,559,489	-	(3,046,544)
99.0%	22,500,000	86,264,774	-	(63,482,181)
99.5%	22,500,000	89,689,266	-	(67,150,284)

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.6 – Whole Account Incl. Cat w\ \$5m Franchise, Term = 3yrs.
 - Ground-up contribution from cat. Limited to \$200m in the annual agg
 - Coverage: 100% of 10% xs. 68%, 5% xs 83%, Term Limit = 37.5%*1-yr SNEPI
 - Premium: 2.25%, Margin 25%
 - PC is 80% of reidual EA

Key Stats	
	EG2.5
NPV	21,728,402
Prob(Econ. Loss)	5.28%
TVaR(95)	(46,527,915)
TVaR(97.5)	(76,338,973)
r(TVaR(95))	8.85%
rTVaR(97.5))	6.18%
ERD	-3.52%

Commentary:

- Reduced PC

R² Insurance Co. – Example Group 2, Attach Higher

- EG2.5 Detail

Detail EG 2.5				
	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
Mean	66,185,121	10,215,650	34,241,070	21,728,402
St.Dev	-	28,415,212	12,469,353	18,516,329
Min	66,185,121	-	-	(260,373,850)
Max	66,185,121	326,558,971	39,711,073	26,474,048
Percentile	NPV(Premium)	NPV(Ceded Loss)	NPV(PC)	NPV(R\I Income)
1.0%	66,185,121	-	39,711,073	26,474,048
5.0%	66,185,121	-	39,711,073	26,474,048
10.0%	66,185,121	-	39,711,073	26,474,048
25.0%	66,185,121	-	39,711,073	26,474,048
50.0%	66,185,121	-	39,711,073	26,474,048
75.0%	66,185,121	-	39,711,073	26,474,048
80.0%	66,185,121	2,169,348	37,975,595	26,040,179
85.0%	66,185,121	18,195,089	25,161,434	22,836,639
90.0%	66,185,121	41,093,277	6,836,451	18,255,394
95.0%	66,185,121	68,933,893	-	(2,590,323)
99.0%	66,185,121	138,410,421	-	(72,007,390)
99.5%	66,185,121	173,128,989	-	(106,932,672)

Sensitivities – EG1 Property

Base

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	3,192,779	5,011,987	4,823,955	6,137,181
Prob(Econ. Loss)	15.19%	11.92%	13.59%	13.06%
TVaR(95)	(24,480,354)	(22,450,739)	(23,702,766)	(33,592,093)
TVaR(97.5)	(24,675,050)	(29,214,635)	(30,091,218)	(45,044,959)
r(TVaR(95))	8.24%	11.10%	10.36%	10.15%
rTVaR(97.5)	8.19%	8.99%	8.59%	8.08%
ERD	-8.58%	-2.85%	-3.00%	-3.22%

Loss Ratios up 5%

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	1,521,887	3,414,401	3,427,866	4,774,774
Prob(Econ. Loss)	21.64%	18.50%	19.50%	17.52%
TVaR(95)	(24,661,594)	(28,892,432)	(29,059,543)	(39,491,211)
TVaR(97.5)	(24,710,413)	(33,853,040)	(33,940,055)	(51,596,122)
r(TVaR(95))	4.96%	6.77%	6.77%	7.26%
rTVaR(97.5)	4.96%	6.07%	6.09%	6.03%
ERD	-13.17%	-4.80%	-4.69%	-4.43%

c Parameters Doubled

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	1,355,118	3,150,698	3,202,001	4,803,310
Prob(Econ. Loss)	20.90%	18.61%	19.37%	16.87%
TVaR(95)	(24,718,585)	(32,603,038)	(32,118,440)	(40,511,744)
TVaR(97.5)	(24,727,153)	(37,227,252)	(37,104,776)	(53,011,389)
r(TVaR(95))	4.73%	6.02%	6.11%	7.26%
rTVaR(97.5)	4.73%	5.52%	5.56%	6.02%
ERD	-14.14%	-5.29%	-5.10%	-4.52%

Sensitivities – EG1 Property

Base

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	3,192,779	5,011,987	4,823,955	6,137,181
Prob(Econ. Loss)	15.19%	11.92%	13.59%	13.06%
TVaR(95)	(24,480,354)	(22,450,739)	(23,702,766)	(33,592,093)
TVaR(97.5)	(24,675,050)	(29,214,635)	(30,091,218)	(45,044,959)
r(TVaR(95))	8.24%	11.10%	10.36%	10.15%
rTVaR(97.5))	8.19%	8.99%	8.59%	8.08%
ERD	-8.58%	-2.85%	-3.00%	-3.22%

Covariance Weights Increased .25

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	2,822,724	3,919,243	4,020,840	5,463,272
Prob(Econ. Loss)	16.06%	14.95%	15.65%	14.82%
TVaR(95)	(24,599,937)	(29,719,538)	(29,355,309)	(37,827,675)
TVaR(97.5)	(24,708,186)	(36,314,694)	(34,836,806)	(49,374,127)
r(TVaR(95))	7.56%	7.21%	7.53%	8.37%
rTVaR(97.5))	7.54%	6.26%	6.66%	6.88%
ERD	-9.77%	-4.36%	-4.17%	-3.94%

G1,G2 Shift = .75

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	3,492,281	5,108,968	4,874,425	6,241,103
Prob(Econ. Loss)	13.29%	11.04%	13.01%	12.57%
TVaR(95)	(24,589,484)	(24,415,218)	(25,305,445)	(33,779,581)
TVaR(97.5)	(24,734,559)	(32,564,867)	(32,353,751)	(44,882,604)
r(TVaR(95))	9.02%	10.70%	10.09%	10.37%
rTVaR(97.5))	8.98%	8.52%	8.33%	8.30%
ERD	-8.04%	-2.83%	-3.02%	-3.20%

Sensitivities – EG1 Property

Base

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	3,192,779	5,011,987	4,823,955	6,137,181
Prob(Econ. Loss)	15.19%	11.92%	13.59%	13.06%
TVaR(95)	(24,480,354)	(22,450,739)	(23,702,766)	(33,592,093)
TVaR(97.5)	(24,675,050)	(29,214,635)	(30,091,218)	(45,044,959)
r(TVaR(95))	8.24%	11.10%	10.36%	10.15%
rTVaR(97.5))	8.19%	8.99%	8.59%	8.08%
ERD	-8.58%	-2.85%	-3.00%	-3.22%

Stochastic Payout

Key Stats				
	EG1.1	EG1.2	EG1.3	EG1.4
NPV	3,192,264	5,010,522	4,823,517	6,133,587
Prob(Econ. Loss)	15.24%	11.93%	13.58%	13.04%
TVaR(95)	(24,478,427)	(22,460,704)	(23,698,323)	(33,617,184)
TVaR(97.5)	(24,676,618)	(29,220,454)	(30,080,332)	(45,068,717)
r(TVaR(95))	8.25%	11.11%	10.37%	10.17%
rTVaR(97.5))	8.20%	9.00%	8.59%	8.09%
ERD	-8.58%	-2.85%	-3.00%	-3.22%

Sensitivities – EG1 Casualty and Whole Account

Base

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	7,226,136	19,019,350	18,946,104	10,876,536	26,580,621
Prob(Econ. Loss)	12.99%	12.03%	12.05%	10.02%	8.71%
TVaR(95)	(38,415,380)	(47,640,359)	(47,664,878)	(32,993,150)	(73,560,025)
TVaR(97.5)	(39,922,655)	(56,545,196)	(56,415,537)	(39,604,307)	(92,980,341)
r(TVaR(95))	5.31%	8.45%	8.35%	8.66%	8.37%
rTVaR(97.5))	5.18%	7.44%	7.37%	7.55%	7.04%
ERD	-6.33%	-2.71%	-2.73%	-3.98%	-2.77%

Loss Ratios up 5%

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	4,110,360	13,599,351	13,490,374	7,674,352	17,641,976
Prob(Econ. Loss)	20.60%	20.55%	20.74%	17.47%	17.61%
TVaR(95)	(39,943,519)	(57,566,877)	(57,411,080)	(40,866,567)	(99,539,417)
TVaR(97.5)	(40,801,939)	(62,839,071)	(62,671,467)	(49,463,388)	(113,057,561)
r(TVaR(95))	3.80%	5.67%	5.61%	5.69%	4.91%
rTVaR(97.5))	3.76%	5.36%	5.31%	5.05%	4.56%
ERD	-10.77%	-4.98%	-5.01%	-7.27%	-5.94%

c Parameters Doubled

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	3,787,211	13,803,003	13,729,565	7,543,014	18,228,260
Prob(Econ. Loss)	19.59%	19.37%	19.46%	16.38%	15.89%
TVaR(95)	(41,022,839)	(61,017,883)	(60,819,793)	(47,705,333)	(105,273,637)
TVaR(97.5)	(41,760,751)	(66,233,133)	(65,974,420)	(53,404,741)	(118,535,148)
r(TVaR(95))	3.66%	5.71%	5.66%	5.12%	4.95%
rTVaR(97.5))	3.63%	5.41%	5.38%	4.79%	4.62%
ERD	-11.84%	-5.15%	-5.17%	-7.91%	-5.86%

Sensitivities – EG1 Casualty and Whole Account

Base

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	7,226,136	19,019,350	18,946,104	10,876,536	26,580,621
Prob(Econ. Loss)	12.99%	12.03%	12.05%	10.02%	8.71%
TVaR(95)	(38,415,380)	(47,640,359)	(47,664,878)	(32,993,150)	(73,560,025)
TVaR(97.5)	(39,922,655)	(56,545,196)	(56,415,537)	(39,604,307)	(92,980,341)
r(TVaR(95))	5.31%	8.45%	8.35%	8.66%	8.37%
rTVaR(97.5))	5.18%	7.44%	7.37%	7.55%	7.04%
ERD	-6.33%	-2.71%	-2.73%	-3.98%	-2.77%

All Covariance Weights Increased .25

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	5,981,890	15,275,953	15,206,946	9,881,085	21,665,014
Prob(Econ. Loss)	15.65%	16.75%	16.83%	11.83%	12.52%
TVaR(95)	(39,649,206)	(60,654,688)	(60,549,873)	(37,225,056)	(101,828,668)
TVaR(97.5)	(40,708,197)	(65,231,592)	(65,017,205)	(46,017,692)	(116,298,610)
r(TVaR(95))	4.65%	5.83%	5.78%	7.30%	5.45%
rTVaR(97.5))	4.58%	5.56%	5.52%	6.29%	5.02%
ERD	-8.26%	-4.53%	-4.55%	-5.13%	-4.69%

G1,G2 Shift = .75

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	7,267,498	19,292,457	19,227,760	10,486,387	25,719,875
Prob(Econ. Loss)	12.14%	10.84%	11.05%	10.43%	9.06%
TVaR(95)	(39,675,307)	(51,245,871)	(51,161,395)	(37,309,352)	(83,164,338)
TVaR(97.5)	(41,055,106)	(60,167,339)	(59,971,535)	(46,729,111)	(102,456,712)
r(TVaR(95))	5.36%	8.29%	8.22%	7.73%	7.55%
rTVaR(97.5))	5.25%	7.36%	7.30%	6.58%	6.50%
ERD	-6.61%	-2.76%	-2.78%	-4.59%	-3.16%

Sensitivities – EG1 Casualty and Whole Account

Base

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	7,226,136	19,019,350	18,946,104	10,876,536	26,580,621
Prob(Econ. Loss)	12.99%	12.03%	12.05%	10.02%	8.71%
TVaR(95)	(38,415,380)	(47,640,359)	(47,664,878)	(32,993,150)	(73,560,025)
TVaR(97.5)	(39,922,655)	(56,545,196)	(56,415,537)	(39,604,307)	(92,980,341)
r(TVaR(95))	5.31%	8.45%	8.35%	8.66%	8.37%
rTVaR(97.5))	5.18%	7.44%	7.37%	7.55%	7.04%
ERD	-6.33%	-2.71%	-2.73%	-3.98%	-2.77%

Stochastic Payout

	Cas.	Cas.	Cas.	Whole Acct.	Whole Acct.
Key Stats					
	EG1.5	EG1.6	EG1.7	EG1.8	EG1.9
NPV	7,130,180	18,868,941	18,766,658	10,798,072	26,407,406
Prob(Econ. Loss)	13.19%	12.20%	12.34%	10.19%	8.89%
TVaR(95)	(38,621,117)	(48,263,297)	(48,734,814)	(33,517,022)	(74,567,365)
TVaR(97.5)	(40,189,840)	(57,157,607)	(57,550,446)	(40,237,861)	(94,087,835)
r(TVaR(95))	5.26%	8.33%	8.18%	8.56%	8.26%
rTVaR(97.5))	5.13%	7.35%	7.24%	7.46%	6.96%
ERD	-6.48%	-2.77%	-2.82%	-4.07%	-2.84%

Sensitivities – EG2

Base

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	13,641,009	19,042,494	5,004,560	6,072,177	19,091,250	21,728,402
Prob(Econ. Loss)	5.51%	5.25%	7.40%	8.04%	5.44%	5.28%
TVaR(95)	(27,056,990)	(35,492,870)	(26,075,494)	(22,137,897)	(34,668,325)	(46,527,915)
TVaR(97.5)	(41,168,587)	(61,585,080)	(32,417,746)	(31,918,163)	(54,958,061)	(76,338,973)
r(TVaR(95))	8.31%	9.21%	9.02%	11.36%	9.40%	8.85%
rTVaR(97.5))	6.15%	6.16%	7.65%	8.49%	6.67%	6.18%
ERD	-8.39%	-3.39%	-20.37%	-5.73%	-7.73%	-3.52%

Loss Ratios up 5%

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	11,585,112	15,402,085	4,148,921	5,043,434	15,911,862	16,335,710
Prob(Econ. Loss)	9.71%	10.18%	10.34%	11.44%	9.92%	11.08%
TVaR(95)	(40,814,322)	(67,886,134)	(30,773,446)	(29,715,638)	(57,956,571)	(92,135,922)
TVaR(97.5)	(48,181,627)	(94,017,453)	(35,571,352)	(40,281,888)	(71,077,311)	(127,276,740)
r(TVaR(95))	5.65%	5.01%	6.98%	7.80%	5.78%	4.49%
rTVaR(97.5))	5.09%	4.17%	6.31%	6.28%	5.08%	3.80%
ERD	-15.75%	-7.36%	-29.18%	-8.87%	-16.16%	-8.55%

c Parameters Doubled

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	10,043,384	11,766,661	3,530,310	4,045,846	14,758,845	13,245,088
Prob(Econ. Loss)	11.95%	14.66%	11.74%	13.52%	10.69%	13.41%
TVaR(95)	(51,656,831)	(98,106,992)	(33,999,758)	(39,653,514)	(70,673,890)	(125,755,441)
TVaR(97.5)	(61,814,320)	(126,317,351)	(40,325,497)	(52,950,191)	(80,670,120)	(168,260,563)
r(TVaR(95))	4.69%	3.62%	6.02%	5.54%	5.06%	3.51%
rTVaR(97.5))	4.25%	3.26%	5.39%	4.65%	4.68%	3.13%
ERD	-23.76%	-12.61%	-36.86%	-12.57%	-21.16%	-12.66%

Sensitivities – EG2

Base

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	13,641,009	19,042,494	5,004,560	6,072,177	19,091,250	21,728,402
Prob(Econ. Loss)	5.51%	5.25%	7.40%	8.04%	5.44%	5.28%
TVaR(95)	(27,056,990)	(35,492,870)	(26,075,494)	(22,137,897)	(34,668,325)	(46,527,915)
TVaR(97.5)	(41,168,587)	(61,585,080)	(32,417,746)	(31,918,163)	(54,958,061)	(76,338,973)
r(TVaR(95))	8.31%	9.21%	9.02%	11.36%	9.40%	8.85%
rTVaR(97.5))	6.15%	6.16%	7.65%	8.49%	6.67%	6.18%
ERD	-8.39%	-3.39%	-20.37%	-5.73%	-7.73%	-3.52%

Covariance Weights Increased .25

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	12,519,324	16,015,158	4,694,421	5,580,473	17,800,864	18,514,255
Prob(Econ. Loss)	7.60%	7.87%	8.39%	8.81%	7.13%	7.46%
TVaR(95)	(38,226,892)	(81,529,470)	(28,543,459)	(29,269,309)	(48,682,181)	(95,232,408)
TVaR(97.5)	(48,325,876)	(114,262,965)	(33,821,184)	(42,447,394)	(66,138,076)	(140,501,676)
r(TVaR(95))	6.26%	4.49%	8.08%	8.47%	7.02%	4.64%
rTVaR(97.5))	5.37%	3.77%	7.13%	6.46%	5.69%	3.79%
ERD	-12.97%	-8.39%	-23.86%	-7.67%	-11.58%	-7.67%

G1,G2 Shift = .75

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	12,973,146	17,259,069	4,780,426	5,637,490	18,237,873	19,688,935
Prob(Econ. Loss)	6.15%	7.45%	7.68%	8.76%	6.30%	6.92%
TVaR(95)	(38,217,373)	(61,916,462)	(29,211,195)	(28,198,693)	(47,519,468)	(76,016,710)
TVaR(97.5)	(51,357,216)	(93,577,404)	(35,020,732)	(41,509,701)	(69,260,435)	(118,370,030)
r(TVaR(95))	6.69%	5.84%	8.36%	9.09%	7.49%	5.79%
rTVaR(97.5))	5.49%	4.54%	7.30%	6.82%	5.77%	4.43%
ERD	-12.18%	-6.12%	-23.41%	-7.49%	-10.91%	-6.07%

Sensitivities – EG2

Base

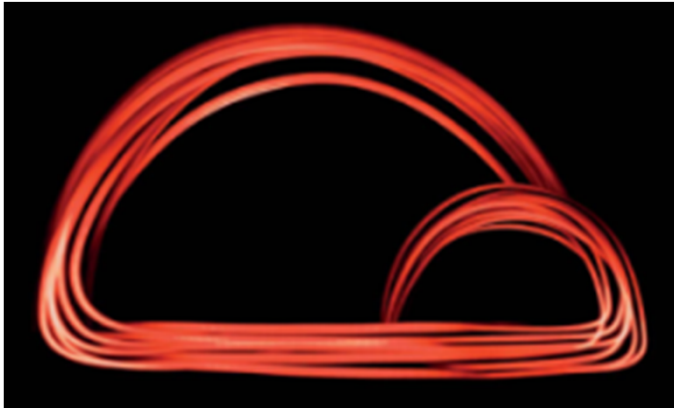
	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	13,641,009	19,042,494	5,004,560	6,072,177	19,091,250	21,728,402
Prob(Econ. Loss)	5.51%	5.25%	7.40%	8.04%	5.44%	5.28%
TVaR(95)	(27,056,990)	(35,492,870)	(26,075,494)	(22,137,897)	(34,668,325)	(46,527,915)
TVaR(97.5)	(41,168,587)	(61,585,080)	(32,417,746)	(31,918,163)	(54,958,061)	(76,338,973)
r(TVaR(95))	8.31%	9.21%	9.02%	11.36%	9.40%	8.85%
rTVaR(97.5)	6.15%	6.16%	7.65%	8.49%	6.67%	6.18%
ERD	-8.39%	-3.39%	-20.37%	-5.73%	-7.73%	-3.52%

Stochastic Payout

	Cas.	Cas.	Prop	Prop	Whole Acct.	Whole Acct.
Key Stats	EG2.1	EG2.2	EG2.3	EG2.4	EG2.5	EG2.6
NPV	13,567,599	18,900,042	5,003,825	6,071,135	19,018,978	21,605,095
Prob(Econ. Loss)	5.66%	5.55%	7.40%	8.05%	5.53%	5.49%
TVaR(95)	(27,911,123)	(37,119,243)	(26,088,092)	(22,148,379)	(35,524,027)	(47,984,161)
TVaR(97.5)	(41,846,052)	(63,520,352)	(32,430,682)	(31,922,249)	(55,764,875)	(78,241,482)
r(TVaR(95))	8.16%	8.87%	9.06%	11.40%	9.29%	8.63%
rTVaR(97.5)	6.11%	6.01%	7.68%	8.52%	6.65%	6.06%
ERD	-8.68%	-3.55%	-20.38%	-5.74%	-7.94%	-3.64%

Name that Tune

TOWERS WATSON 



Common Shock CAD

Igloo