Reading: Odomirok.19-RBC

(RBC - R4) a-Question 01

Model: n/a

Problem Type: Calculate RBC charge R_4 (reserve risk)

Given

	Line of Business		
	LOB 1	LOB 2	LOB 3
industry average L+LAE LDF (9 prior AYs)			0.962
company average L+LAE LDF (9 prior AYs)			1.105
industry L+LAE RBC %			0.180
adjustment for investment income			0.87
company L+LAE Reserves *(gross of NTD)*	7,700	17,800	9,300
(NTD = Non-Tabular Discount)			
portion of reserves on retro-rated plan			
% **direct** loss-sensitive			6.0%
% **assumed** loss-sensitive			1.0%
Reserve RBC charge **after discounts**	1,463	3,204	?

Excessive Premium Growth Charge *(add to total RBC)*	420
RBC for reinsurance recoverables *(part of R_3 calc)*	178

Assume:

$R_4 >$ (RBC charge for NON-INVESTED ASSETS) + (1/2)x(RBC charge for reins recoverables)

Find Calculate the total R_4 RBC charge for all 3 lines combined

TRICK *Don't forget to add **1/2 of RBC for reinsurance recoverables** at the very end.*

Total R_4 RBC for all lines = 4,790 <== final answer

Apply equations 1, 2, 3 in succession to arrive at the final answer.

Equation 1: *Base RBC*

R_4 Base RBC	=	[[(C+1) x A] -1] x (Reserves)

where

C	=	**Company** L+LAE RBC%	=	0.1934	<== see weighting below
A	=	Adjustment for investment income	=	0.870	<== given

C is a 50/50 weighting between:

industry L+LAE RBC% = 0.180 <== given (weight = 50%)

industry L+LAE RBC% adjusted for **company experience**

=	**industry** L+LAE RBC%	x	(**company average** LDF)	/	(**industry average** LDF)	
=	0.180	x	1.105	/	0.962	
=	0.207	<== weight = 50%				

Putting this all together gives:

R_4 Base RBC	=	[(1.1934	x	0.87)	-	1]	x	9,300
R_4 Base RBC	=	355.6						

Equation 2: *Subtract Loss-Sensitive Discount (LSD)*

R_4 RBC after discount	=	Base RBC	-	LSD

where

LSD	=	Base RBC	x	(D%	+	A%)
	=	355.6	x	1.95%		
	=	6.9				
D%	=	30%	x	(% direct loss sensitive)		
	=	30%	x	6.0%		
	=	1.80%				
A%	=	15%	x	(% assumed loss sensitive)		
	=	15%	x	1.0%		
	=	0.15%				

Putting this together gives:

R_4 RBC after discount	=	Base RBC	-	LSD
R_4 RBC after discount	=	355.6	-	6.93
R_4 RBC after discount	=	348.7		

Equation 3: *Final RBC after applying Loss Concentration Factor (LCF)*

Calculate LCF and apply it to all lines of business

LCF	=	0.7	+	0.3	x	(max reserve)		/	(total reserve)		
	=	0.7	+	0.3	x	17,800		/	34,800		
	=	0.853									

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Putting this together gives the final answer: *(RR = Reinsurance Recoverables RBC calc'd as part of R_3)*

Total R_4 RBC (all lines)	=	pre-LCF total	x	LCF	+	growth	+	1/2(RR)
Total R_4 RBC (all lines)	=	(1463 + 3204 + 348.7)	x	0.853	+	420	+	89
Total R_4 RBC (all lines)	=	4,790	<== final answer					

Reading: Odomirok.19-RBC
Model: n/a
Problem Type: Calculate RBC charge R_4 (reserve risk)

Given

	Line of Business		
	LOB 1	LOB 2	LOB 3
industry average L+LAE LDF (9 prior AYs)			0.980
company average L+LAE LDF (9 prior AYs)			1.056
industry L+LAE RBC %			0.420
adjustment for investment income			0.94
company L+LAE Reserves *(gross of NTD)*	9,600	16,600	6,700
(NTD = Non-Tabular Discount)			
portion of reserves on retro-rated plan			
% **direct** loss-sensitive			6.0%
% **assumed** loss-sensitive			1.0%
Reserve RBC charge **after discounts**	1,056	3,320	?

Excessive Premium Growth Charge *(add to total RBC)*	468
RBC for reinsurance recoverables *(part of R_3 calc)*	119

Assume:

$R_4 >$ (RBC charge for NON-INVESTED ASSETS) + (1/2)x(RBC charge for reins recoverables)

Find Calculate the total R_4 RBC charge for all 3 lines combined

TRICK *Don't forget to add **1/2 of RBC for reinsurance recoverables** at the very end.*

Total R_4 RBC for all lines = 6,211 <== final answer

Apply equations 1, 2, 3 in succession to arrive at the final answer.

Equation 1: *Base RBC*

R_4 Base RBC	=	[[(C+1) x A] -1] x (Reserves)

where

C	=	**Company** L+LAE RBC%	=	0.4363	<== see weighting below
A	=	Adjustment for investment income	=	0.940	<== given

C is a 50/50 weighting between:

industry L+LAE RBC% = 0.420 <== given (weight = 50%)

industry L+LAE RBC% adjusted for **company experience**

=	**industry** L+LAE RBC%	x	(**company average** LDF)	/	(**industry average** LDF)	
=	0.420	x	1.056	/	0.980	
=	0.453	<== weight = 50%				

Putting this all together gives:

R_4 Base RBC	=	[(1.4363	x	0.94)	-	1]	x	6,700
R_4 Base RBC	=	2,345.7						

Equation 2: *Subtract Loss-Sensitive Discount (LSD)*

R_4 RBC after discount	=	Base RBC	-	LSD

where

LSD	=	Base RBC	x	(D%	+	A%)
	=	2,345.7	x	1.95%		
	=	45.7				
D%	=	30%	x	(% direct loss sensitive)		
	=	30%	x	6.0%		
	=	1.80%				
A%	=	15%	x	(% assumed loss sensitive)		
	=	15%	x	1.0%		
	=	0.15%				

Putting this together gives:

R_4 RBC after discount	=	Base RBC	-	LSD
R_4 RBC after discount	=	2,345.7	-	45.74
R_4 RBC after discount	=	2,300.0		

Equation 3: *Final RBC after applying Loss Concentration Factor (LCF)*

Calculate LCF and apply it to all lines of business

LCF	=	0.7	+	0.3	x	(max reserve)		/	(total reserve)		
	=	0.7	+	0.3	x	16,600		/	32,900		
	=	0.851									

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Putting this together gives the final answer: *(RR = Reinsurance Recoverables RBC calc'd as part of R_3)*

Total R_4 RBC (all lines)	=	pre-LCF total	x	LCF	+	growth	+	1/2(RR)
Total R_4 RBC (all lines)	=	(1056 + 3320 + 2300)	x	0.851	+	468	+	60
Total R_4 RBC (all lines)	=	6,211	<== final answer					

Reading: Odomirok.19-RBC
Model: n/a
Problem Type: Calculate RBC charge R_4 (reserve risk)

Given

	Line of Business		
	LOB 1	LOB 2	LOB 3
industry average L+LAE LDF (9 prior AYs)			0.960
company average L+LAE LDF (9 prior AYs)			1.044
industry L+LAE RBC %			0.330
adjustment for investment income			0.90
company L+LAE Reserves *(gross of NTD)*	17,500	8,800	18,300
(NTD = Non-Tabular Discount)			
portion of reserves on retro-rated plan			
% **direct** loss-sensitive			6.0%
% **assumed** loss-sensitive			0.0%
Reserve RBC charge **after discounts**	3,325	968	?

Excessive Premium Growth Charge *(add to total RBC)*	494
RBC for reinsurance recoverables *(part of R_3 calc)*	99

Assume:

R_4 > (RBC charge for NON-INVESTED ASSETS) + (1/2)x(RBC charge for reins recoverables)

Find Calculate the total R_4 RBC charge for all 3 lines combined

TRICK *Don't forget to add **1/2 of RBC for reinsurance recoverables** at the very end.*

Total R_4 RBC for all lines = 7,183 <== final answer

Apply equations 1, 2, 3 in succession to arrive at the final answer.

Equation 1: *Base RBC*

R_4 Base RBC	=	[[(C+1) x A] -1] x (Reserves)

where

C	=	**Company** L+LAE RBC%	=	0.3444	<== see weighting below
A	=	Adjustment for investment income	=	0.900	<== given

C is a 50/50 weighting between:

industry L+LAE RBC% = 0.330 <== given (weight = 50%)

industry L+LAE RBC% adjusted for **company experience**

=	**industry** L+LAE RBC%	x	(**company average** LDF)	/	(**industry average** LDF)	
=	0.330	x	1.044	/	0.960	
=	0.359	<== weight = 50%				

Putting this all together gives:

R_4 Base RBC	=	[(1.3444	x	0.9)	-	1]	x	18,300
R_4 Base RBC	=	3,842.9						

Equation 2: *Subtract Loss-Sensitive Discount (LSD)*

R_4 RBC after discount	=	Base RBC	-	LSD

where

LSD	=	Base RBC	x	(D%	+	A%)
	=	3,842.9	x	1.80%		
	=	69.2				
D%	=	30%	x	(% direct loss sensitive)		
	=	30%	x	6.0%		
	=	1.80%				
A%	=	15%	x	(% assumed loss sensitive)		
	=	15%	x	0.0%		
	=	0.00%				

Putting this together gives:

R_4 RBC after discount	=	Base RBC	-	LSD
R_4 RBC after discount	=	3,842.9	-	69.17
R_4 RBC after discount	=	3,773.7		

Equation 3: *Final RBC after applying Loss Concentration Factor (LCF)*

Calculate LCF and apply it to all lines of business

LCF	=	0.7	+	0.3	x	(max reserve)		/	(total reserve)		
	=	0.7	+	0.3	x	18,300		/	44,600		
	=	0.823									

Putting this together gives the final answer: *(RR = Reinsurance Recoverables RBC calc'd as part of R_3)*

Total R_4 RBC (all lines)	=	pre-LCF total	x	LCF	+	growth	+	1/2(RR)		
Total R_4 RBC (all lines)	=	(3325 + 968 + 3773.7)	x	0.823	+	494	+	50		
Total R_4 RBC (all lines)	=	7,183	<== final answer							

Reading: Odomirok.19-RBC
Model: n/a
Problem Type: Calculate RBC charge R_4 (reserve risk)

Given

	Line of Business		
	LOB 1	LOB 2	LOB 3
industry average L+LAE LDF (9 prior AYs)			0.962
company average L+LAE LDF (9 prior AYs)			1.084
industry L+LAE RBC %			0.210
adjustment for investment income			0.95
company L+LAE Reserves *(gross of NTD)*	5,600	11,100	10,800
(NTD = Non-Tabular Discount)			
portion of reserves on retro-rated plan			
% **direct** loss-sensitive			3.0%
% **assumed** loss-sensitive			2.0%
Reserve RBC charge **after discounts**	1,008	1,554	?

Excessive Premium Growth Charge *(add to total RBC)*	228
RBC for reinsurance recoverables *(part of R_3 calc)*	65

Assume:

$R_4 >$ (RBC charge for NON-INVESTED ASSETS) + (1/2)x(RBC charge for reins recoverables)

Find Calculate the total R_4 RBC charge for all 3 lines combined

TRICK *Don't forget to add **1/2 of RBC for reinsurance recoverables** at the very end.*

Total R_4 RBC for all lines = 3,785 <== final answer

Apply equations 1, 2, 3 in succession to arrive at the final answer.

Equation 1: *Base RBC*

R_4 Base RBC	=	[[(C+1) x A] -1] x (Reserves)

where

C	=	**Company** L+LAE RBC%	=	0.2233	<== see weighting below
A	=	Adjustment for investment income	=	0.950	<== given

C is a 50/50 weighting between:

industry L+LAE RBC% = 0.210 <== given (weight = 50%)

industry L+LAE RBC% adjusted for **company experience**

=	**industry** L+LAE RBC%	x	(**company average** LDF)	/	(**industry average** LDF)	
=	0.210	x	1.084	/	0.962	
=	0.237	<== weight = 50%				

Putting this all together gives:

R_4 Base RBC	=	[(1.2233	x	0.95)	-	1]	x	10,800
R_4 Base RBC	=	1,751.2						

Equation 2: *Subtract Loss-Sensitive Discount (LSD)*

R_4 RBC after discount	=	Base RBC	-	LSD

where

LSD	=	Base RBC	x	(D%	+	A%)
	=	1,751.2	x	1.20%		
	=	21.0				
D%	=	30%	x	(% direct loss sensitive)		
	=	30%	x	3.0%		
	=	0.90%				
A%	=	15%	x	(% assumed loss sensitive)		
	=	15%	x	2.0%		
	=	0.30%				

Putting this together gives:

R_4 RBC after discount	=	Base RBC	-	LSD
R_4 RBC after discount	=	1,751.2	-	21.01
R_4 RBC after discount	=	1,730.2		

Equation 3: *Final RBC after applying Loss Concentration Factor (LCF)*

Calculate LCF and apply it to all lines of business

LCF	=	0.7	+	0.3	x	(max reserve)		/	(total reserve)		
	=	0.7	+	0.3	x	11,100		/	27,500		
	=	0.821									

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Putting this together gives the final answer: *(RR = Reinsurance Recoverables RBC calc'd as part of R_3)*

Total R_4 RBC (all lines)	=	pre-LCF total	x	LCF	+	growth	+	1/2(RR)
Total R_4 RBC (all lines)	=	(1008 + 1554 + 1730.2	x	0.821	+	228	+	32
Total R_4 RBC (all lines)	=	3,785	<== final answer					