Reading: Werner 14: Implementation
Model: Text Example
Problem Type: Limiting Premium Effect of a Single Variable (Non-Base Level)

Find Calculate the relativities that satisfy the given requirements.

overall rate change	5%
maximm premium increase for any level of the rating variable	15%

Given **Rating variable information prior to capping**

level	premium	current	indicated
A	125,000	0.67	0.83
B	623,000	1.00	1.00
C	171,000	1.18	1.24
total	919,000	--	--

Step 1 calculate total % change for each rating variable level

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
level	premium	current	indicated	change	off-bal	overall	total chg	new prem
A	125,000	0.67	0.83	23.88%	0.9597	5%	24.84%	156,048
B	623,000	1.00	1.00	0.00%	0.9597	5%	0.77%	627,817
C	171,000	1.18	1.24	5.08%	0.9597	5%	5.90%	181,084
total	919,000	--	--	4.19%	0.9597	5%	5.00%	964,950
				= Δs%				

(5) = (4) / (3) - 1.0
(Tot5) = (5) weighted by (2)
(6) = 1.0 / (1.0 + (Tot5)) = off-balance = 1 / (1 + Δs%)
(7) = given
(8) = [1.0 + (5)] x (6) x [1.0 + (7)] - 1.0
(9) = (2) x (1.0 + (8))

Step 2a cap relativity for non-base level A so that total change doesn't exceed 15% by solving for R below:

R / current	x	off-bal	x	(1 + overall)	=	1+ max		
R / 0.67	x	0.9597	x	1.05	=	1.15	====>	R = 0.7646

new indicated relativity for level A

Step 2b calculate the premium shortfall created by the cap in step 2a

revised premium for A	=	(9)	x	R	/	(4)
	=	156,048	x	0.7646	/	0.8300
	=	**143,750**				
shortfall	=	156,048	-	**143,750**	=	12,298

Step 3a redistribute this shortfall across levels B and C by increasing the base rate by a proportional amount

premium for levels B & C	=	627,817	+	181,084	=	**808,902**
required base rate increase	=	12,298	/	**808,902**	=	**1.520%**

Step 3b BUT, we must now back out this base rate increase from level A otherwise the cap will be exceeded by that same amount

final indicated relativity for level A	=	R	/	(1 + base rate increase)
	=	0.7646	/	**1.01520**
	=	0.7531		

Reading: Werner 14: Implementation
Model: Text Example
Problem Type: Limiting Premium Effect of a Single Variable (Non-Base Level)

Find Calculate the relativities that satisfy the given requirements.

overall rate change	12%
maximm premium increase for any level of the rating variable	20%

Given **Rating variable information prior to capping**

level	premium	current	indicated
A	132,000	0.68	0.85
B	724,000	1.00	1.00
C	155,000	1.18	1.24
total	1,011,000	--	--

Step 1 calculate total % change for each rating variable level

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
level	premium	current	indicated	change	off-bal	overall	total chg	new prem
A	132,000	0.68	0.85	25.00%	0.9611	12%	34.56%	177,618
B	724,000	1.00	1.00	0.00%	0.9611	12%	7.65%	779,365
C	155,000	1.18	1.24	5.08%	0.9611	12%	13.12%	175,337
total	1,011,000	--	--	4.04%	0.9611	12%	12.00%	1,132,320
				= Δs%				

(5) = (4) / (3) - 1.0
(Tot5) = (5) weighted by (2)
(6) = 1.0 / (1.0 + (Tot5)) = off-balance = 1 / (1 + Δs%)
(7) = given
(8) = [1.0 + (5)] x (6) x [1.0 + (7)] - 1.0
(9) = (2) x (1.0 + (8))

Step 2a cap relativity for non-base level A so that total change doesn't exceed 20% by solving for R below:

R / current	x	off-bal	x	(1 + overall)	=	1+ max		
R / 0.68	x	0.9611	x	1.12	=	1.20	====>	R = 0.7580

new indicated relativity for level A

Step 2b calculate the premium shortfall created by the cap in step 2a

revised premium for A	=	(9)	x	R	/	(4)	
	=	177,618	x	0.7580	/	0.8500	
	=	**158,400**					
shortfall	=	177,618	-	**158,400**	=	19,218	<==== *premium shortfall*

Step 3a redistribute this shortfall across levels B and C by increasing the base rate by a proportional amount

premium for levels B & C	=	779,365	+	175,337	=	**954,702**	
required base rate increase	=	19,218	/	**954,702**	=	**2.013%**	<==== *base rate increase*

Step 3b BUT, we must now back out this base rate increase from level A otherwise the cap will be exceeded by that same amount

final indicated relativity for level A	=	R	/	(1 + base rate increase)
	=	0.7580	/	**1.02013**
	=	0.7431	<====	*final answer for proposed Level A relavitiy*