Reading: Werner Appendix D: Worker's Compensation
Model: Text Example
Problem Type: Loss Ratio Rate Indication for WC

Werner D (020) - (Problem 1)

Find Calculate the final company rate change using both industry and company data.

Given

information required for step 1 of solution: **PROJECTED LOSS COST PREMIUM**

effective date:	2024	1	1	(year, month, day)
rates in effect for	12	months		
policy term:	12	months		

** loss cost premium is already at CRL (Current Rate Level)*

AY	industry loss cost premium	annual payroll change	Historical Experience Mod (HEM)
2020	3,530	-1.0%	0.950
2021	3,020	0.5%	0.860
2022	3,440	5.0%	0.880

Projected Annual Wage Change (PAWC)	1.0%
Expected Experience Modification (EEM)	0.900

information required for step 2 of solution: **PROJECTED MEDICAL LOSS RATIO**

projected medical fee schedule change:	2.0%	= fee % change
projected other medical change:	4.0%	= other % change

portion of medical loss subject to fee schedule = m 60.0% use this fee % to calculate a weighted average

AY	Rptd Med Loss	Med Loss LDF to Ult	Med Fee Sched Change	Other Medical Change
2020	1,533	1.000	6.0%	2.0%
2021	1,509	1.700	-1.0%	1.0%
2022	1,599	2.500	10.0%	4.0%

information required for step 3 of solution: INDUSTRY & COMPANY INDICATED RATE CHANGES

Step 3a	indemnity cost loss ratio:	21.0%	Step 3b	V + Q:	22.0%
	LAE ratio to ult loss:	23.0%		expected loss cost difference:	3.0%
				current deviation:	1.550

Here are some notes on STEP 2 of the solution that didn't fit on the solution page:

(5) = weighted average of (3) and (4) with weights m and (1-m)
(6) = product of (1.0 + "lower" entries) from (5)
(7) = m x (1.0 + med % change)^(trend period) + (1 - m) x (1.0 + other % change)^(trend period)
= 0.6 x (1.02)^ 2.5 + 0.4 x (1.04)^ 2.5
(8) = (1) x (2) x (6) x (7)
(9) = (8) / (projected loss cost premium from Step 1b)

Step 1 calculate the projected loss cost premium (WC advisory loss costs)

1a trend period for 'step 2' in '2-step' trending

=	(AAD for latest available year)			to	(AAD of effective period)		
=	2022	7	1	to	2025	1	1
=	2.5000	years					

PAWC:

trend factor = (1 + 1.0%) ^ 2.5 = 1.0252

1b calculate the 'projected loss cost premium'

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	(this is the given information)			factor to	expected future			
CY	industry loss cost premium	annual payroll change	Hist. Exp. Mod (HEM)	current wage level	wage level change	experience mod factor	projected loss cost premium	
2020	3,530	-1.0%	0.950	1.0553	1.0252	0.9474	3,617.91	<==== *final answers to step 1*
2021	3,020	0.5%	0.860	1.0500	1.0252	1.0465	3,402.11	<==== *final answers to step 1*
2022	3,440	5.0%	0.880	1.0000	1.0252	1.0227	3,606.84	<==== *final answers to step 1*
							10,626.86	<==== *final answers to step 1*

(4) = (1.0 + (2)NextRow) x (4NextRow) = product of (1.0 + "lower" entries) from (2)
(5) = (1 + PAWC)^(trend period) <==== trend factor from step 1a
(6) = EEM / (3) = EEM / HEM <==== this is like 'on-leveling' the experience modification
(7) = (1) x (4) x (5) x (6)

Notes:
- column (4) is similar to 'step 1' in '2-step' trending
- column (5) is similar to 'step 2' in '2-step' trending
- column (6) is similar on-leveling premium except here we're 'on-leveling' the experience modification

Step 2 calculate the projected medical loss ratio

	(this is the given information)				(these are the calculated columns)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AY	Rptd Med Loss	Med Loss LDF to Ult	Med Fee Sched Change	Other Medical Change	combined effect of medical trends	factor to current med cost level	combined effect of projected trend	projected ultimate medical loss	projected ultimate medical LR
2020	1,533	1.000	6.0%	2.0%	4.4%	0.996	1.072	1,636.29	45.23%
2021	1,509	1.700	-1.0%	1.0%	-0.2%	1.076	1.072	2,958.06	86.95%
2022	1,599	2.500	10.0%	4.0%	7.6%	1.000	1.072	4,283.96	118.77%
							totals ==>	8,878.31	83.55%

<==== *final ans to step 2*

Step 3 calculate the industry and company rate changes

industry indicated rate change

=	(	med LR	+	indem LR	)	x	(	1 +	LAE ratio	) - 1.0
=	(	83.5%	+	21.0%	)	x	(	1 +	23%	) - 1.0
=	28.59%	<==== *industry rate change (assumes V+Q = 0)*								

proposed deviation from industry = (expense & profit adjustment) x (operational adjustment)
= 1 / (1 - V - Q) x (1 + expected loss cost difference)
= 1.3205

company indicated rate change = (proposed deviation) / (current deviation) x (1 + industry chg) - 1.0
= 9.55% <==== *FINAL ANSWER!!*

Reading: Werner Appendix D: Worker's Compensation
Model: Text Example
Problem Type: Loss Ratio Rate Indication for WC

Werner D (020) - (Problem 2)

Find Calculate the final company rate change using both industry and company data.

Given

information required for step 1 of solution: **PROJECTED LOSS COST PREMIUM**

effective date:	2024	7	1	(year, month, day)
rates in effect for	12	months		
policy term:	12	months		

** loss cost premium is already at CRL (Current Rate Level)*

AY	industry loss cost premium	annual payroll change	Historical Experience Mod (HEM)
2020	1,730	-0.5%	0.970
2021	3,170	-0.5%	0.940
2022	3,070	3.5%	0.930

Projected Annual Wage Change (PAWC)	1.0%
Expected Experience Modification (EEM)	0.940

information required for step 2 of solution: **PROJECTED MEDICAL LOSS RATIO**

projected medical fee schedule change:	-1.0%	= fee % change
projected other medical change:	2.0%	= other % change

portion of medical loss subject to fee schedule = m 80.0% use this fee % to calculate a weighted average

AY	Rptd Med Loss	Med Loss LDF to Ult	Med Fee Sched Change	Other Medical Change
2020	785	1.100	-26.0%	3.0%
2021	1,359	1.400	-4.0%	4.0%
2022	1,317	2.200	5.0%	3.0%

information required for step 3 of solution: INDUSTRY & COMPANY INDICATED RATE CHANGES

Step 3a	indemnity cost loss ratio:	21.0%
	LAE ratio to ult loss:	22.0%

Step 3b	V + Q:	27.0%
	expected loss cost difference:	4.0%
	current deviation:	1.680

Here are some notes on STEP 2 of the solution that didn't fit on the solution page:

(5) = weighted average of (3) and (4) with weights m and (1-m)
(6) = product of (1.0 + "lower" entries) from (5)
(7) = m x (1.0 + med % change)^(trend period) + (1 - m) x (1.0 + other % change)^(trend period)
= 0.8 x (0.99)^ 3 + 0.2 x (1.02)^ 3
(8) = (1) x (2) x (6) x (7)
(9) = (8) / (projected loss cost premium from Step 1b)

Step 1 calculate the projected loss cost premium (WC advisory loss costs)

1a trend period for 'step 2' in '2-step' trending

=	(AAD for latest available year)			to	(AAD of effective period)		
=	2022	7	1	to	2025	7	1
=	3.0000	years					

PAWC:

trend factor = (1 + 1.0%) ^ 3 = 1.0303

1b calculate the 'projected loss cost premium'

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	(this is the given information)			factor	expected			
CY	industry loss cost premium	annual payroll change	Hist. Exp. Mod (HEM)	to current wage level	future wage level change	experience mod factor	projected loss cost premium	
2020	1,730	-0.5%	0.970	1.0298	1.0303	0.9691	1,778.81	<==== *final answers to step 1*
2021	3,170	-0.5%	0.940	1.0350	1.0303	1.0000	3,380.36	<==== *final answers to step 1*
2022	3,070	3.5%	0.930	1.0000	1.0303	1.0108	3,197.03	<==== *final answers to step 1*
							8,356.20	<==== *final answers to step 1*

(4) = (1.0 + (2)NextRow) x (4NextRow) = product of (1.0 + "lower" entries) from (2)
(5) = (1 + PAWC)^(trend period) <==== trend factor from step 1a
(6) = EEM / (3) = EEM / HEM <==== this is like 'on-leveling' the experience modification
(7) = (1) x (4) x (5) x (6)

Notes:
- column (4) is similar to 'step 1' in '2-step' trending
- column (5) is similar to 'step 2' in '2-step' trending
- column (6) is similar on-leveling premium except here we're 'on-leveling' the experience modification

Step 2 calculate the projected medical loss ratio

	(this is the given information)				(these are the calculated columns)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AY	Rptd Med Loss	Med Loss LDF to Ult	Med Fee Sched Change	Other Medical Change	combined effect of medical trends	factor to current med cost level	combined effect of projected trend	projected ultimate medical loss	projected ultimate medical LR
2020	785	1.100	-26.0%	3.0%	-20.2%	0.953	0.988	813.07	45.71%
2021	1,359	1.400	-4.0%	4.0%	-2.4%	1.046	0.988	1,967.20	58.19%
2022	1,317	2.200	5.0%	3.0%	4.6%	1.000	0.988	2,864.02	89.58%
							totals ==>	5,644.29	67.55%

<==== *final ans to step 2*

Step 3 calculate the industry and company rate changes

industry indicated rate change

=	(	med LR	+	indem LR	)	x	(1 +	LAE ratio	) - 1.0
=	(	67.5%	+	21.0%	)	x	(1 +	22%	) - 1.0

= 8.03% <==== *industry rate change (assumes V+Q = 0)*

proposed deviation from industry = (expense & profit adjustment) x (operational adjustment)
= 1 / (1 - V - Q) x (1 + expected loss cost difference)
= 1.4247

company indicated rate change = (proposed deviation) / (current deviation) x (1 + industry chg) - 1.0
= -8.39% <==== *FINAL ANSWER!!*