

Errata to
Credible Loss Ratio Claims Reserves: The Benktander, Neuhaus
and Mack Methods Revisited

By Hürlimann, W. in *ASTIN Bulletin* 39(1), 2009

Casualty Actuarial Society¹

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This note presents errata to various tables and formulas in Hürlimann's paper on "Credible Loss Ratio Claims Reserves." Items printed in **red** indicate an update, clarification, or change.

1. Errata

- Table 7.4 of Hürlimann (page 95) should be amended from:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
all periods	86,752	87,810	86,751	86,837	86,486
1	14,307	14,307	14,307	14,307	14,307
2	9,964	9,882	9,906	9,891	9,966
3	12,772	12,660	12,706	12,686	12,779
4	11,443	11,112	11,313	11,266	11,484
5	20,826	22,947	21,022	21,219	20,364
6	17,440	16,902	17,498	17,469	17,586

to:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
all periods	85,992	87,810	86,751	86,837	86,752
1	14,307	14,307	14,307	14,307	14,307
2	10,043	9,882	9,906	9,891	9,964
3	12,878	12,660	12,706	12,686	12,772
4	11,731	11,112	11,313	11,266	11,443
5	19,284	22,947	21,022	21,219	20,826
6	17,749	16,902	17,498	17,469	17,440

¹ This note was prepared by the Exam 7 Syllabus Committee.

- Table 7.5 of Hürlimann (page 95) should be amended from:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
2	1.027133	1.028713	1.014146	1.022818	1
3	1.058036	1.065943	1.003002	1.038856	1
4	1.115378	1.153525	1.002692	1.044128	1
5	1.198612	1.376096	1.120972	1.012892	1
6	1.244417	1.740080	1.409648	1.002206	1

to:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
2	1.027133	1.028713	1.014146	1.022818	1
3	1.058037	1.065943	1.023277	1.038856	1
4	1.115379	1.153525	1.023764	1.044128	1
5	1.198610	1.376096	1.003211	1.012892	1
6	1.244422	1.740080	1.008555	1.002208	1

- Table 7.10 of Hürlimann (page 97) should be amended from:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
2	1.001629	1.001634	1.001405	1.001615	1
3	1.029900	1.031834	1.021187	1.024673	1
4	1.046368	1.051243	1.029035	1.033985	1
5	1.111731	1.146991	1.036943	1.044625	1
6	1.228790	1.548854	1.000149	1.000894	1

to:

Origin Period	Method				
	collective	individual	Neuhaus	Benktander	optimal
2	1.001566	1.001571	1.001342	1.001551	1
3	1.029900	1.031833	1.021187	1.024673	1
4	1.046373	1.051248	1.029039	1.033989	1
5	1.111729	1.146989	1.036940	1.044623	1
6	1.228789	1.548852	1.000148	1.000893	1

- The following formula from Hürlimann (page 88, formula 4.14) should be amended from:

$$\text{mse}(R_i^{\text{ind}}) = E[(R_i^{\text{ind}} - R_i)^2] = \text{Var}[R_i^{\text{ind}} - R_i] = \text{Var}[R_i^{\text{coll}}] - 2\text{Cov}[R_i^{\text{ind}}, R_i] + \text{Var}[R_i]$$

to:

$$\text{mse}(R_i^{\text{ind}}) = E[(R_i^{\text{ind}} - R_i)^2] = \text{Var}[R_i^{\text{ind}} - R_i] = \text{Var}[\mathbf{R}_i^{\text{ind}}] - 2\text{Cov}[R_i^{\text{ind}}, R_i] + \text{Var}[R_i]$$

- The following formula from Hürlimann (page 92) should be amended from:

$$\widehat{\text{Var}}[R_i^c] = \left(\hat{Z}_i^2 \cdot (1 + f_i) \cdot \left[1 + \frac{1 - p_i}{p_i} \frac{\hat{t}_i}{1 - \hat{t}_i} \right] - 2\hat{Z}_i + 1 \right) \cdot \text{Var}[R_i^{\text{coll}}]$$

to:

$$\widehat{\text{Var}}[R_i^c] = \left(\hat{Z}_i^2 \cdot (1 + f_i) \cdot \left[1 + \frac{1 - p_i}{p_i} \frac{\hat{t}_i}{\mathbf{1} + \hat{\mathbf{t}}_i} \right] - 2\hat{Z}_i + 1 \right) \cdot \text{Var}[R_i^{\text{coll}}]$$