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ACTUARIAL SOCIETY OF SOUTH AFRICA

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Scenario Testing for Flatrated Fleets during the yearly price adjustment process – a Practical Application

Session ASTIN, 5th of April 2019, 15.30 p.m.

Michael Klamser, 26.3.2019
Allianz Insurance Company (Commercial Motor)

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SECTION COLLOQUIUM 2019

About the speaker

- **Michael Klamser (Senior Actuary)**
- **1986-1994:** Studies in Econometrics (TU Karlsruhe)
- **1994:** Entering Allianz Insurance Company (Actuarial Department)
- **1994-2000:** Actuarial Department (Motor business – retail and commercial)
- **2000-today:** Commercial Motor Department
- **Since 1999:** Actuary at the German Association of Actuaries (DAV)

- **Allianz Insurance Company (Non-Life) - 2016**
- GWP: 9,4 bln. € (fleet market: 3,5 bln)
- Loss ratio: 73,3 % (fleet market/before run-off: 95,5 %)
- Combined Ratio 97,1 % (fleet market/after run-off: 106,3%)
- Net income: 583 mln €

Disclaimer:

All the figures/KPIs in the following slides which are connected with the Allianz fleet portfolio, do not correspond with the figures in reality.

Still, the deductions done in the presentation respectively during the session are the same as the ones based on the real figures.

Glossary:

TP: (actuarially correct) technical premium

CP: commercial premium (sold by the Underwriter)

AP: actual respectively offered premium

LR: loss-ratio (**not** lapse-ratio!!)

Overview

1. The flatrate model (cred.) / Bonus-Malus
2. The lapse ratio model: The Build-up of the database
3. The lapse ratio model: The forward selection procedure
4. The lapse ratio model: The „rate book“
5. The lapse ratio model: 9-field-analysis / scenario-analysis

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1. The flatrate model (cred.) / Bonus-Malus - 1

Basics:

- Introduced in 2013;
- An essential model to increase the profitability of the overall flatrate portfolio;
- As of end of 2017: approx. 1.000 fleets with an AP of 70 Mio.;
- Includes an **optional** premium adjustment-clause
  (➔ to compensate for the loss in GWP due to automatic renewal).
- Enables a new calculation of the fleet if certain criteria are met.

1. The flatrate model (cred.) / Bonus-Malus - 2

Rules for automatic renewal:

- LR<45 % ➔ -15 % discount,
- LR in (45%,55%) ➔ -10 % discount,
- ….
- LR in (85%,95%) ➔ +15 % loading,
- LR > 95 % ➔ new calculation on the basis of credibility.

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2. The lapse ratio model: The Build-up of the database - 1

Variables to be examined conc. signficance

- duration of a fleet in the portfolio
- number of large claims in the previous years,
- fleet mix,
- distribution channel,
- industry,
- fleets flagged for ptf-cleaning,
- premium change…

2. The lapse ratio model: The Build-up of the database - 2

Challenges

- Challenge 1: adequate grouping of some variables (e. g. fleet mix, industry);
- Challenge 2: prediction of the finally offered premium for next year (lag of 6 months);
- Challenge 3: fleets **manually** renewed by the Underwriters (see backup!).

2. The lapse ratio model: The Build-up of the database - 3

<u>Challenge 1:</u> adequate grouping of fleet mix - 1

<u>Prerequisite:</u>

All flatrated fleets are taken into account.

<u>Step 1:</u> Determination of vehicle groups (cars,trucks,trailers,misc.)

<u>Step 2:</u> Quantile-analysis to form subgroups for each vehicle groups

e. g.

- <u>for cars:</u> share up to 25%/50%/75%/100%,
- <u>for trucks:</u> share up to 20%/40%/100%

- both in relation to the total number of vehicles per fleet.

cars	Max	90%-Q.	75%-Q.	Median	25%-Q.	10%-Q.	Min.
	100,0%	100,0%	87,7%	47,9%	13,3%	3,4%	0,0%

2. The lapse ratio model: The Build-up of the database - 4

<u>Challenge 1:</u> adequate grouping of fleet mix - 2

<u>Step 3:</u> Application of Cluster-Analysis (procedure by **<u>Ward's minimum-variance method</u>**)

- <u>Response variable:</u> lapse-ratio;
- Dividing the original sample in 80/20%-layered samples;
- Defining the stop-criterion.

cluster	parent	_HEIGHT_	_SPRSQ_	_RMSSTD_	_RSQ_	Lapse-Ratio
			....			
CL9	CL6	0,0030	0,0030	0,0161	0,9860	19,3%
OB26	CL6	0,0000	0,0000	0,0000	1,0000	26,7%
CL11	CL5	0,0018	0,0018	0,0034	0,9915	9,7%
CL17	CL5	0,0004	0,0004	0,0023	0,9990	8,3%
CL5	CL4	0,0221	0,0221	0,0085	0,9256	5,4%
CL10	CL4	0,0025	0,0025	0,0075	0,9890	12,7%
CL7	CL3	0,0119	0,0119	0,0124	0,9646	20,8%
CL6	CL3	0,0169	0,0169	0,0334	0,9477	7,9%
CL4	CL2	0,0364	0,0364	0,0126	0,8892	0,8%
CL8	CL2	0,0094	0,0094	0,0118	0,9766	6,9%
CL2	CL1	0,2979	0,2979	0,0279	0,4869	14,0%
CL3	CL1	0,1045	0,1045	0,0343	0,7848	8,3%

- **<u>HEIGHT:</u>** identifies the between-cluster distance measure
- **<u>SPRSQ:</u>** squared semipartial correlation for joining 2 clusters
- **<u>RMSSTD:</u>** Root mean squared standard deviation
- **<u>RSQ:</u>** R-square statistic for a given level of the hierarchy

2. The lapse ratio model: The Build-up of the database - 5

<u>Challenge 1:</u> adequate grouping of fleet mix - 3

<u>Step 4:</u> Validation of the test sample

Cluster (fleet mix)	# fleets (test)	# fleets (validation)	lapse-ratio (test)	lapse-ratio (validation)
1	201	42	0,8%	1,9%
2	1.208	282	5,9%	5,4%
3	400	117	10,1%	9,2%
4	55	15	18,8%	13,8%
Total	**1.865**	**455**	**6,6%**	**6,1%**

<u>Step 5:</u> Characterization of the Clusters

<table>
<tr><th>Cluster (fleet mix)</th><th>vehicle group</th><th>share with regard to fleet mix</th><th>#fleets</th><th>lapse-ratio</th></tr>
<tr><td>1</td><td colspan="4">-----------------</td></tr>
<tr><td rowspan="4">2</td><td>cars</td><td>75 % and higher</td><td rowspan="4">1600</td><td rowspan="4">5,9%</td></tr>
<tr><td>trailers</td><td rowspan="3">lowest quantile group</td></tr>
<tr><td>Trucks/tractors</td></tr>
<tr><td>misc.</td></tr>
<tr><td>3</td><td colspan="4">-----------------</td></tr>
<tr><td>4</td><td colspan="4">-----------------</td></tr>
</table>

2. The lapse ratio model: The Build-up of the database - 6

<u>Challenge 2:</u> prediction of the finally offered premium for next year - 1

<u>Predicament:</u>

An eventual overall premium-adjustment in addition to the automatic renewal has to be decided no later than in August (due to technical restraints).

➔ Prediction of the loss-ratio as of 31st of December on the basis of 31st of July is of paramount importance.

<u>Possible solution (see also **SAS/STAT – PROC GENMOD, examples**) :</u>

Application of the Generalized Linear Model with

- the **<u>multinomial distribution</u>** and
- the **<u>cumulative logit function</u>**.

2. The lapse ratio model: The Build-up of the database - 7

<u>Challenge 2:</u> prediction of the finally offered premium for next year - 2

<u>In a nutshell:</u>

(1) Creating a **<u>grouped ordinal-scaled predictor</u>** η

e. g. LR as of 31st of July grouped into „up to 20 %", „20 to 40 %",….,"higher than 200 %".

(2) Defining the ordinal scaled response – in dependence of the „rules for automatic renewal"

(see above, chapter 1 ➔ 7 LR-classes).

(3) For each of the k LR-classes as of 31st of July (k=1 to 7), be

p_i^k the probability that the fleet falls into the i-th LR-class as of 31st of December (i=1 to 7).

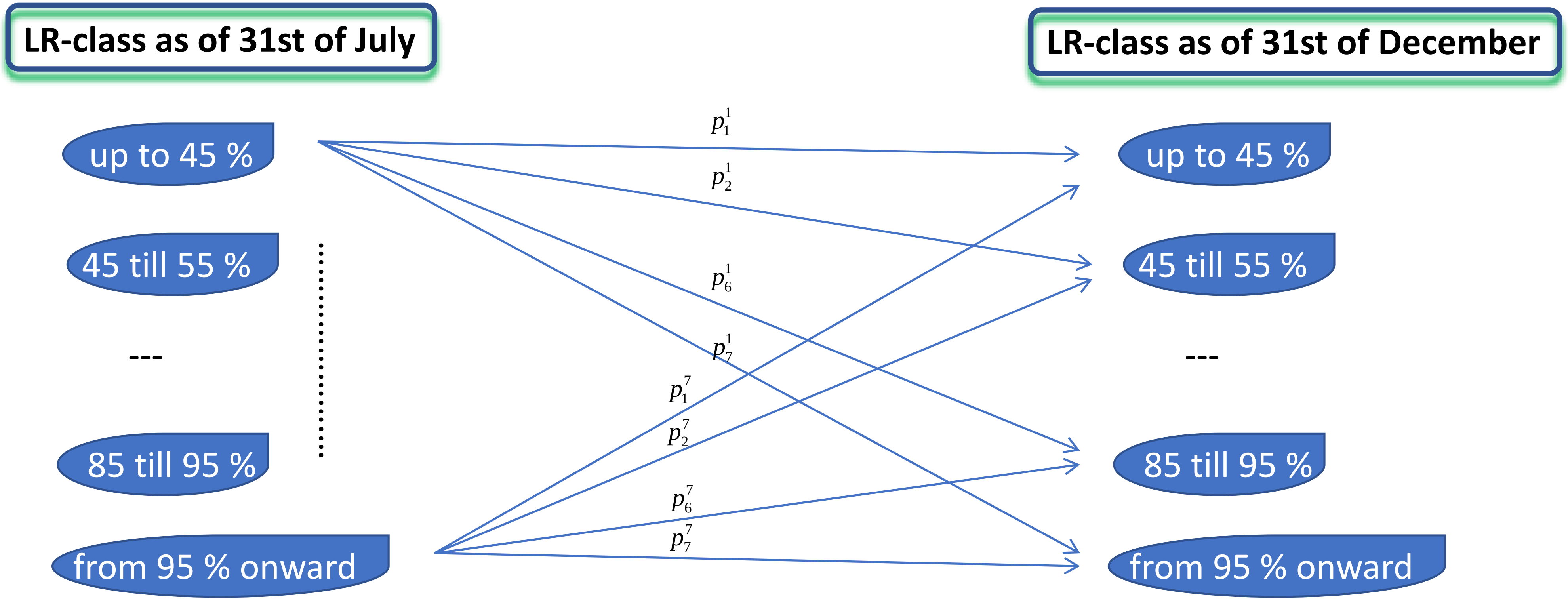
Then the cumulative logit function for the i-th LR-class is $g(p_1^k, p_2^k, \ldots, p_i^k) = \log(\sum_{j=1}^{i} p_j^k / (1 - \sum_{j=1}^{i} p_j^k))$

(4) Finally, through a simple recursion all the estimates for the p_i can be determinded –

and this in dependence of the respective linear predictor η.

2. The lapse ratio model: The Build-up of the database - 8

Challenge 2: prediction of the finally offered premium for next year - 3



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3. The lapse ratio model: The forward selection procedure - 1

<u>Procedure (for single and 2x2-effects):</u>

- <u>Model assumptions:</u>

  $alpha$ ➔ maximum significance level (5 %),

  p_i ➔ lapse ratio for fleet i,

  $g(p_i) = \log(p_i/(1-p_i))$ ➔ Link-function,

  <u>distribution:</u> bin(1,p_i) .

- Out of the pool of m possibly significant predictors, the most significant factor is selected.

- <u>2nd step:</u> the 2nd most significant factor is selected (and so forth)…

- <u>Stop criterion:</u> The sum of all single $alpha^*$ surpasses the maximum significance level $alpha$.

3. The lapse ratio model: The forward selection procedure - 2

Result (for single effects):

Model analysis:

predictor	1st degree freedom	F-statistics	alpha*
---	---		
fleet mix	2	16,45	<.0001
distribution channel	1	79,51	<.0001
rate change	2	10,47	<.0001
portfolio cleaning (flagged)	1	21,62	<.0001
….	---		

Parameter estimates:

predictor	level	lower conf. Limit	estimate	upper conf. Limit	Standard-error	Chi-square	alpha (Chi-square)
Intercept		-3,45	**-1,67**	-0,04	0,87	3,6	-0,025
---							
fleet mix	1	-2,33	**-1,60**	-1,02	0,33	22,99	<.0001
	3	-1,56	**-0,82**	-0,23	0,34	5,76	0,0157
	4	0,00	**0,00**	0,00	0,00	.	.
distribution channel	tied agent	-2,32	**-1,78**	-1,39	0,24	56,58	<.0001
	broker	0,00	**0,00**	0,00	0,00	.	.
rate change	1	-1,43	**-0,93**	-0,59	0,21	18,72	<.0001
	2	-1,18	**-0,72**	-0,42	0,19	13,51	0,0002
	3	0,00	**0,00**	0,00	0,00	.	.
portfolio cleaning	not flagged	-1,57	**-1,06**	-0,71	0,22	23,05	<.0001
	flagged	0,00	**0,00**	0,00	0,00	.	.

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3. The lapse ratio model: The forward selection procedure - 3

Beware! Don‵t forget the 2x2-effects!!!

But: Even if several 2x2-effects are identified as significant, heed the alpha (Chi-square)!

The only relevant 2x2-effects to be added to the model was:

„distribution channel“ x „ptf cleaning (flagged)“.

$$f(x) = \frac{e^x}{1+e^x} (= lapse-ratio)$$

			estimate single effect		sum single effects (distr.channel/ ptf cleaning)	estimate 2x2 effect (distr. channel/ ptf clean.)	sum single + 2x2- effects (distr.channel/ ptf cleaning)	estimate intercept	sum single + 2x2- effects (distr.channel/ ptf cleaning/ intercept
selected effects	**distribution channel**	**ptf cleaning**	**distribution channel**	**ptf cleaning**					
single effects	**tied agent**	**not flagged**	-1,78	-1,06	**-2,84**	0,00	**-2,84**	-1,67	**-4,51**
		flagged	-1,78	0,00	**-1,78**	0,00	**-1,78**	-1,67	**-3,45**
	broker	**not flagged**	0,00	-1,06	**-1,06**	0,00	**-1,06**	-1,67	**-2,73**
		flagged	0,00	0,00	**0,00**	0,00	**0,00**	-1,67	**-1,67**
single / 2x2-effects	**tied agent**	**not flagged**	-0,63	-0,68	**-1,31**	-1,45	**-2,76**	-1,85	**-4,61**
		flagged	-0,63	0,00	**-0,63**	0,00	**-0,63**	-1,85	**-2,48**
	broker	**not flagged**	0,00	-0,68	**-0,68**	0,00	**-0,68**	-1,85	**-2,53**
		flagged	0,00	0,00	**0,00**	0,00	**0,00**	-1,85	**-1,85**

3. The lapse ratio model: The forward selection procedure - 3

Alpha (Chi-square), considering single and 2x2-effect „distr.channel“ x „ptf cleaning“:

predictor	level1	level2	estimate	Standard-error	Chi-square	alpha (Chi-square)
Intercept			-1,8926	0,88	4,88	**0,0272**
---						
fleet mix	1		-1,565	0,34	22,58	**<.0001**
	3		-0,7897	0,34	5,81	**0,0159**
	4		0	0,00	.	**.**
distribution channel	tied agent		-0,6695	0,40	3,16	**0,0754**
	broker		0	0,00	.	**.**
rate change	1		-0,9087	0,21	19,60	**<.0001**
	2		-0,7108	0,19	15,13	**0,0001**
	3		0	0,00	.	**.**
portfolio cleaning	not flagged		-0,7159	0,25	9,39	**0,0022**
	flagged		0	0,00	.	**.**
distribution channel x ptf cleaning	tied agent	not flagged	-1,4937	0,51	9,16	**0,0025**
	tied agent	flagged	0	0,00	.	**.**
	broker	not flagged	0	0,00	.	**.**
	broker	flagged	0	0,00	.	**.**

Slight deterioration of alpha (Chi-square) at level tied agent – but still acceptable.

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4. The lapse ratio model: The „rate book“ - 1

Distribution of lapse ratio: „ratebook“ vs. AZ-portfolio

segment	minimum	10 %-quantile	25 %-quantile	50 %-quantile	60 %-quantile	70 %-quantile	80 %-quantile	90 %-quantile	95 %-quantile	maximum
lapse ratio estimated ("ratebook")	3,0%	3,3%	4,1%	6,5%	9,3%	14,5%	22,6%	32,8%	44,7%	77,6%
lapse ratio estimated (AZ portfolio)	3,0%	3,5%	4,4%	9,5%	14,6%	16,6%	25,7%	40,6%	43,5%	62,0%

No surprise:
In AZ-portfolio, tendency towards lower retention rate in comparison to ratebook!

One reason:
Large fleets have a much higher share in the broker-channel
(the latter one being prone to higher lapses).

4. The lapse ratio model: The „rate book" - 2

Span in lapse ratio for some effects:

fleet mix	# fleets	Lapse-Ratio (observed)	Lapse-Ratio (estimated)	Std. deviance of the mean
high share of cars	837	5,8%	5,0%	0,09%
2	282	12,9%	12,1%	
3	38	23,0%	23,0%	

rate change	# fleets	Lapse-Ratio (observed)	Lapse-Ratio (estimated)	Std. deviance of the mean
1	541	3,8%	3,4%	0,44%
2	402	9,0%	7,4%	
3	214	17,1%	17,1%	

after grouping
reduction to 3 clusters

distribution channel	ptf cleaning	# fleets	Lapse-Ratio (observed)	Lapse-Ratio (estimated)	Std. deviance of the mean
tied agent	not flagged	406	1,6%	3,6%	0,56%
	flagged	41	13,4%	13,4%	
broker	not flagged	647	10,0%	10,0%	
	flagged	63	26,3%	26,3%	

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5. The lapse ratio model: 9-field-analysis / scenario-analysis - 1

9-field-analysis: Categorization of the AP/TP-ratio and the Lapse-Ratio (table):

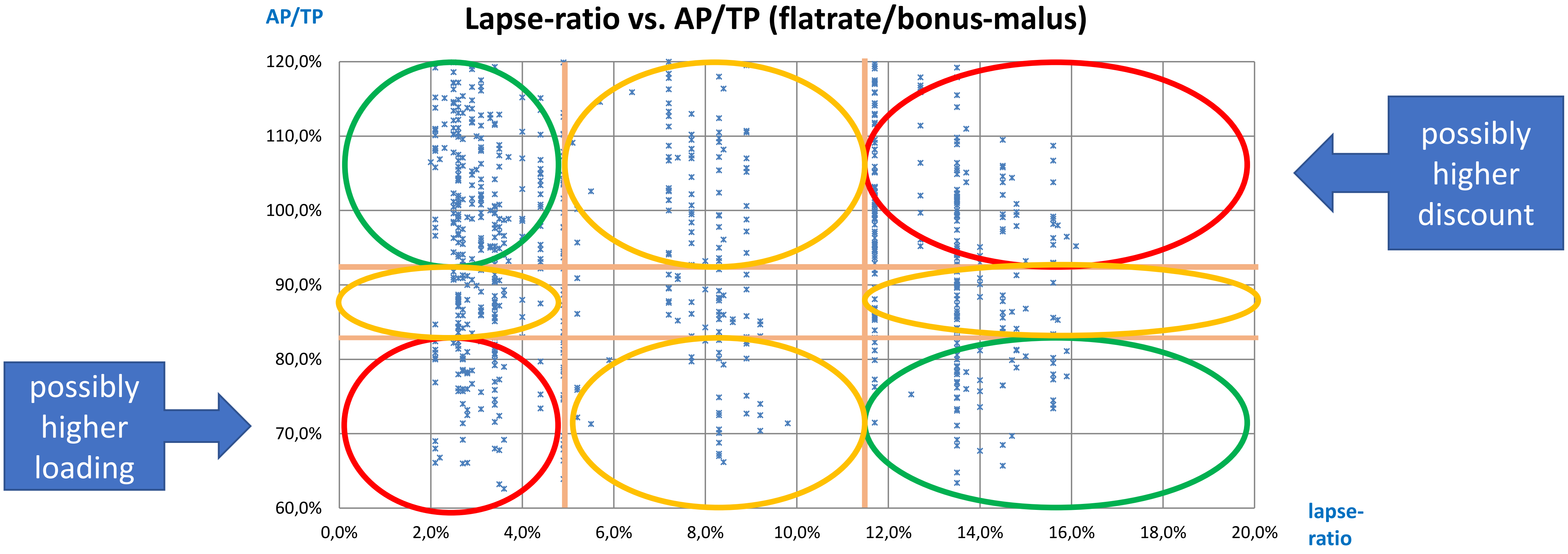
APTP-Segment	Lapse-Ratio-Segment	# fleets	AP (JUL/2017)	lapse-ratio (estimated)	AP/TP-ratio
APTP-ratio (low)	lapse-ratio (low)	156	6,78	3,2%	72,0%
	lapse-ratio (medium)	108	4,68	8,4%	73,1%
	lapse-ratio (high)	242	14,13	23,7%	73,2%
APTP-ratio (low)		**506**	**25,59**	**14,1%**	**72,8%**
APTP-ratio (medium)	lapse-ratio (low)	90	4,74	3,3%	88,0%
	lapse-ratio (medium)	58	3,00	9,4%	87,2%
	lapse-ratio (high)	108	6,55	20,7%	87,7%
APTP-ratio (medium)		**256**	**14,28**	**12,0%**	**87,7%**
APTP-ratio (high)	lapse-ratio (low)	250	12,55	3,0%	110,6%
	lapse-ratio (medium)	150	9,03	9,0%	104,5%
	lapse-ratio (high)	107	8,33	19,7%	100,5%
APTP-ratio (high)		**507**	**29,91**	**8,3%**	**105,8%**

- **low:** <40 %-quantile
- **medium:** between 40 and 60 %-quantile
- **high:** > 60 %-quantile

	40%-quantile	Median	60%-quantile
Lapse-Ratio	4,9%	8,3%	11,7%
APTP-Ratio	82,9%	87,5%	91,7%

5. The lapse ratio model: 9-field-analysis / scenario-analysis - 2

9-field-analysis: Categorization of the AP/TP-ratio and the Lapse-Ratio (graph):



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5. The lapse ratio model: 9-field-analysis / scenario-analysis - 3

<u>scenario-analysis:</u> 20 scenarios (prem. adjustment 0 % to 20 %) - table

prem. adjustm.	# fleets (2017)	# fleets (renewed)	AP (2018) (renewed)	Lapse-Ratio (estimated)	AP/TP-Ratio (2017)	AP/TP-Ratio (2018) (renewed)
0%	1.267	1.157	63,4	11,1%	87,7%	89,6%
1%		1.150	63,1	11,3%		89,9%
2%		1.150	62,9	11,4%		90,4%
3%		1.153	63,7	11,6%		90,9%
4%		1.153	64,1	11,7%		91,5%
5%		1.150	64,9	11,8%		92,1%
6%		1.142	64,6	12,0%		92,4%
7%		1.140	64,7	12,2%		93,0%
8%		1.136	65,2	12,4%		93,6%
9%		1.135	65,5	12,6%		94,2%
10%		1.106	63,9	14,7%		94,8%
11%		1.103	63,8	15,1%		95,3%
12%		1.091	62,9	15,5%		95,5%
13%		1.087	63,6	15,9%		96,0%
14%		1.084	63,1	16,3%		96,4%
15%		1.081	63,0	16,7%		96,9%
16%		1.071	62,4	17,0%		97,6%
17%		1.066	62,4	17,4%		98,0%
18%		1.056	61,8	18,1%		98,8%
19%		1.045	62,4	18,5%		98,9%
20%		1.041	62,0	19,0%		99,1%

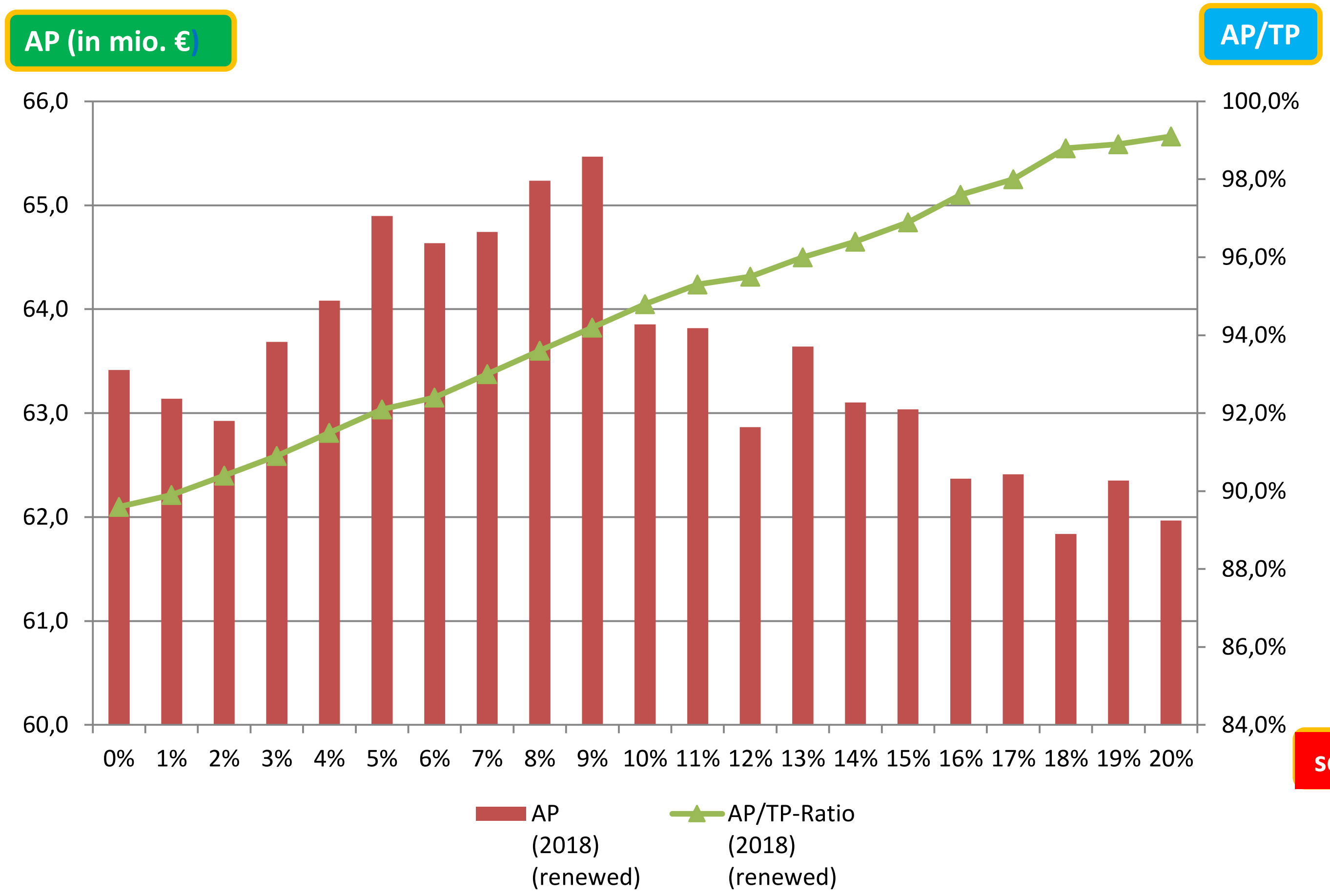
<u>premises:</u>

x up to 9 % increase in premium adjustment
➔ x % increase in overall lapse-ratio.

x from 10 % to 20 % increase
in premium adjustment
➔ 3 times x % increase in overall lapse-ratio.

5. The lapse ratio model: 9-field-analysis / scenario-analysis - 4

<u>scenario-analysis:</u> 21 scenarios (prem. adjustment 0 % to 20 %) - graph



<u>result:</u>
With maximum AP being the requirement by the Board of Management, 9 % would be the optimal premium adjustment factor.

scenarios respectively premium adjustment factor

“The only thing worse than fighting with allies is fighting without them.”

(by Winston Churchill, in the 1940-ies)

Though competition advances us forward,

only by <u>cooperation</u> can we manage to master the real challenges ahead –

„dog eats dog“ is doomed to fail.

Thank you very much for your attention!

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BACKUP

2. The lapse ratio model: The Build-up of the database - 9

Challenge 3: fleets manually renewed by the Underwriters - 1

remark:

Manual renewal happens in the last 3 months before the actual renewal of a fleet policy - one of the main reasons being to prevent premium adjustments from taking place.

Target:

Simulation of this phenomenon so as not to overestimate the effect of a premium adjustment.

Procedure:

- Grouping of the loss-ratio as of 31st of July (in 10%-intervals).
- Application of the cluster method by Ward with the response „manual-renewal-ratio“

2. The lapse ratio model: The Build-up of the database - 10

<u>Challenge 3:</u> fleets manually renewed by the Underwriters - 2

<u>Attention:</u>

There is no way for Ward to guarantee that the resulting clusters will consist of coherent intervals, thus ensuring organic results!

<u>But:</u> Ward entailed indeed 4 clusters with coherent intervals :

Cluster	loss-ratio (as of 31st of July)	manual-renewal-ratio
1	above 170 %	93,0%
2	120 % to 170 %	63,0%
3	60 % to 120 %	45,0%
4	up to 60 %	25,0%

The higher the LR, the higher the probabilty that a fleet will be manually adjusted.

2. The lapse ratio model: The Build-up of the database

Cluster method by Ward (source: SAS/STAT guide):

The distance between two clusters is defined by

If $d(\mathbf{x},\mathbf{y}) = \frac{1}{2}\|\mathbf{x}-\mathbf{y}\|^2$ then the combinatorial formula is $D_{KL} = B_{KL} = \frac{\|\bar{\mathbf{x}}_K - \bar{\mathbf{x}}_L\|^2}{\frac{1}{N_K}+\frac{1}{N_L}}$

$$D_{JM} = \frac{(N_J+N_K)D_{JK} + (N_J+N_L)D_{JL} - N_J D_{KL}}{N_J+N_M}$$

In **Ward's minimum-variance method**, the distance between two clusters is the ANOVA sum of squares between the two clusters added up over all the variables. At each generation, the within-cluster sum of squares is minimized over all partitions obtainable by merging two clusters from the previous generation.
The sums of squares are easier to interpret when they are divided by the total sum of squares to give proportions of variance (squared semipartial correlations).

Ward's method joins clusters to maximize the likelihood at each level of the hierarchy under the following assumptions:
- multivariate normal mixture,
- equal spherical covariance matrices,
- equal sampling probabilities.

Peculiarities:
- Ward's method tends to join clusters with a small number of observations;
- It is strongly biased toward producing clusters with roughly the same number of observations;
- It is also very sensitive to outliers.

The calculation of the TP - 1

a.) Technical Premium (TP)

a.1.) The Tariff premium:

vehicle group
cars non-rental
trucks (light/heavy) - on own account/haulage
tractors - on own account/haulage
trailers - on own account/haulage
bus
vehicle rental
...

Industry
trade
agriculture
production
financial services
construction
logistics
...

TPL:

- vehicle group / industry

MOD:

- vehicle group / industry / deductible group

The calculation of the TP - 2

a.2.) The experience premium:

- observed KPIs per claims-layer for the actual fleet,
- trend + prognosis factor,
- weighting of different calendar years (e. g. fleet size, actuality…),
- IBNR/IBNER.

The calculation of the TP - 3

a.3.) The risk premium on the basis of credibility:

$$z_i^d = w_i^d / (w_i^d + k),$$ **credibiliy factor for claims-layer d and KPI i**

w_i^d: e. g. expected number of claims (for the KPI “overall claims frequency”)

$k = \sigma / \tau$, where σ: variability of the fleet over time, τ: variability between the fleets

cf: claims frequency, ca: claims average

Thus, for dimension d and KPI i, we get: $cred\_prem_i^d = z_i^d * \exp erience_i^d + (1 - z_i^d) * \text{tariff}_i^d$

➔ $risk\_premium = cf_{cred}^{overall} * ca_{cred}^{bas} + cf_{cred}^{exc(>25k)} * ca_{cred}^{exc(25k-80k)} + loading^{exc(>80k)}$

➔ $net\ premium = risk\_premium$ (incl. cost loadings).

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The calculation of the TP - 4

a.) definitions -1:

<u>KPIs per claims layer:</u>

(1) claims frequency (number of claims / exposure),

(2) claims average (claims amount / number of claims).

The calculation of the TP - 5

a.) definitions -2:

<u>Dimensions (e. g. for TPL)</u>

(1) basis-layer up to 25k (for claims frequency and claims average);

(2) excess-layer 25k to 80k (ditto);

(3) excess-layer >80k (rel. or abs loading in dependence of vehicle group).

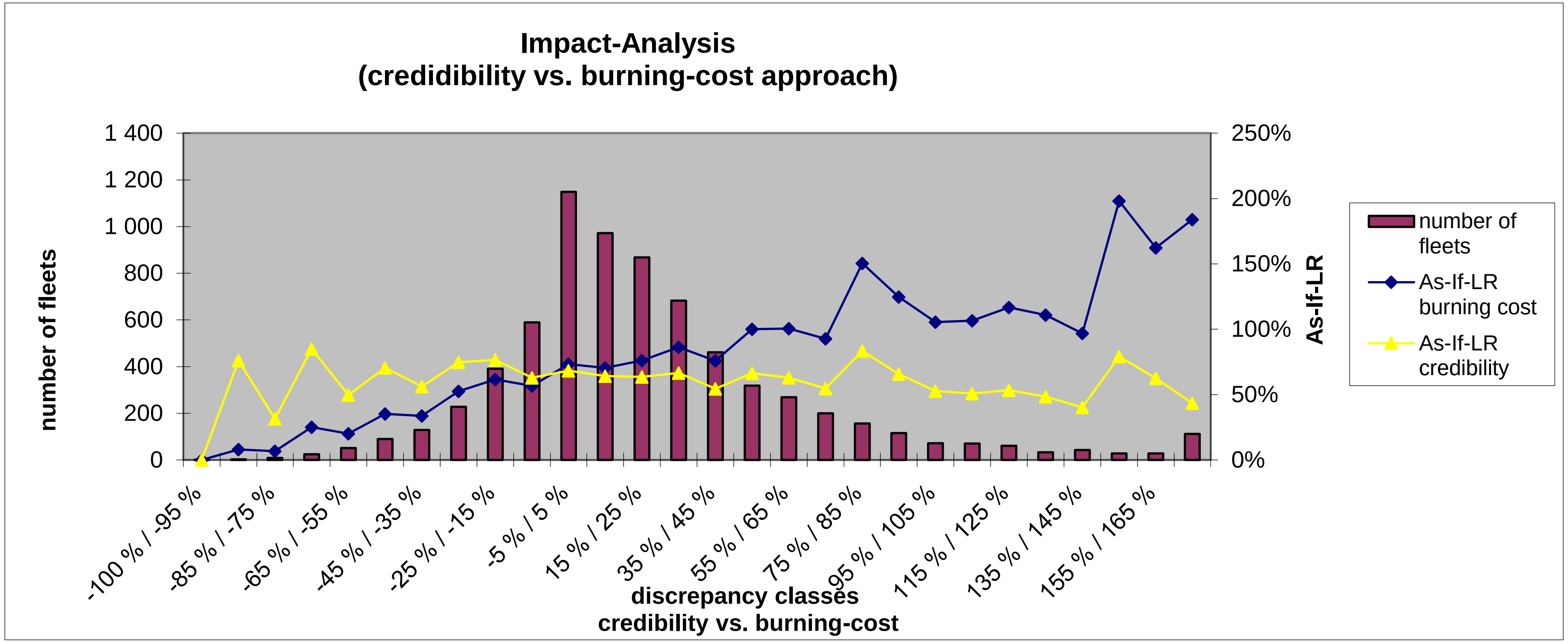
The calculation of the TP - 6

Experience / Tariff / credibility factor (example pricing tool):

		number of vehicles: 234	**KPI's**			
		number of claims/year: 40	**experience**	**Tariff**	**cred.-factor**	**KPI per claims-layer (weighted)**
claims-layer	**basis-layer**	**claims frequency**	16,3%	7,8%	0,965	**16,0%**
		claims average (capped at 25k)	1.998 €	2.389 €	0,818	**2.069 €**
	excess-layer 1 (25-80k)	**claims frequency (excess-layer 1, but >25k)**	0,92%	0,38%	0,640	**0,73%**
		claims average (excess-layer 1)	44.659 €	14.743 €	0,000	**14.743 €**
	excess-layer 2 (>80k)	**loading for large losses/vehicle (excess-layer 2)**	**risk premium/basis-layer**			332 €
		50 €	**risk premium/excess-layer (>25k)**			157 €
			risk premium/vehicle (total)			489 €
			risk premium / fleet			**114.441 €**

The calculation of the TP - 7

b.) Techniques to assess the quality of the TP – 1
➔ Impact analysis through a graphical approach



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The calculation of the TP - 8

b.) Techniques to assess the quality of the TP – 2
➔ Impact analysis through a statistical approach

	premium type	10 %-Quantil	25 %-Quantil	Median	75 %-Quantil	90 %-Quantil	Diff. Q75 zu Q25	Diff. Q90 zu Q10
CP vs TP	CP	53,6%	62,9%	68,9%	81,7%	87,3%	18,8%	33,7%
	TP	47,1%	62,4%	70,1%	74,8%	83,4%	12,4%	36,3%
TP vs AP	TP	56,7%	63,8%	70,0%	79,0%	88,3%	15,2%	31,6%
	AP	57,2%	71,1%	81,0%	91,8%	106,9%	20,6%	49,6%
CP vs AP (only cred-models)	CP	58,3%	62,4%	72,0%	78,0%	85,5%	15,6%	27,2%
	AP	64,8%	72,5%	79,8%	87,9%	94,0%	15,4%	29,2%

- **Comparison CP vs TP: TP obviously slightly better than the CP (minor deterioration);**
- **Comparison TP vs AP: Obviously a much higher Xsubsidy on the basis of AP than TP.**
- **Comparison CP vs. AP (restricted to cred.-models): Both spans show practically no difference.**