Reinsurance

Long-tail liability risks

Pricing Risk capital management Flexible bespoke structures Optimal capital retention and more...



Benefits and strategic competitive advantages

The ICRFS[™] Reinsurance platform provides many unparalleled benefits and strategic competitive advantages to Reinsurers and their clients.

- Risk characteristics of the business provided by unique modeling frameworks.
- Loss scenarios are based on auditable and explicit assumptions that can be statistically validated by the data.
- Models can be developed for individual lines or a composite model for multiple LoBs with volatility correlations (measured from the data) relating the individual LoBs. Either modeling framework can provide input into the Reinsurance module.
- Both on-the-fly scenarios and fully automatable what-if analyses can be incorporated into Reinsurance pricing.
- Accurate risk capital assessments are reflected in competitive pricing of portfolios.
- Flexible and customisable reinsurance structures can be applied to loss development arrays.
- Reinsurance contracts can be monitored.
- Contracts can be prospective and retrospective.
- Reinsurance contracts can be assessed for correlations with existing business.
- Risk capital requirements for the Insurer can be calculated Net of Reinsurance.
- Optimal reinsurance programs for risk capital management can be developed for the cedant.

All of these benefits enable Reinsurers to take on risk according to their risk appetite with many competitive advantages.

Insurers can assess whether they are obtaining a fair price for the reinsurance programs given the level of risk ceded to a reinsurer from the insurers LoBs. As the reinsurance module is ambivalent to whether the user is the Reinsurer or the cedant, all advantages and benefits apply equally to either party.

Data Driven Reinsurance



ICRFS™ Reinsurance

Designed for ADCs and LPTs:

- Mitigate model specification risk
- Monitor multiple ADC and LPT reinsurance contracts simultaneously
- Reserve Risk net of reinsurance contracts
- Design optimal retention policies
- Manage risk capital efficiently
- Price ADCs and LPTs
- Prospective and Retrospective
- Long tail liability Enterprise Risk Management
- Contracts with varying quota share by layer



What input is required for the reinsurance module?

A single composite MPTF model is identified from the data, for multiple LoBs, that measures the volatility (and trend) structure in each LoB and the volatility correlations between the LoBs.

In essence, on a log scale, a normal distribution is fitted to every cell in the loss development arrays and the means of these distributions are related in the identified trend structure.

In respect of projections for future years a lognormal distribution is forecast for every cell using explicit, auditable assumptions for each LoB.

Given that there is no closed analytical probability distribution for the sum of lognormals, to find the distribution of the aggregate of lognormals we simulate from each lognormal also giving consideration to their correlations.

The simulations from the correlated lognormal distributions are the input into the Reinsurance module.

An example of a forecast table for multiple LoBs with the forecast correlated lognormal distributions is shown below.

E:Composite DS:MPTF[0]	s F:Composite DS:MPTF[Good-1]:Combined Forecast Table														
Dataset Cl. Aggregate		Accident Period vs Development Period													
Fatworkningen 23 Femereningen 3 FShottPUDLEP 4		Cal. Per. Total	0	1	2	3	4	5	6	7	8	9	29	Outstanding	Ultimate ^
	2012	1,953	557	910	413	296	213	209	206	203	199	196	58	5,275	7,810
	2013	2,023	509	945	19					35	36	36	31	1,255	1,255
	2014	2,482	713	1,165	52	Blacl	k nur	nbers	=	259	255	251	75	7,020	10,422
	2014	2,416	564	1,153	62	Fit	ted n	neans		47	47	.6	40	1,639	1,639
	2015	2,688	405	662	30					147	145		42	4 140	5 846
	2013	2,242	432	694	220	241	119	27	27	27	27	— E	ed/Burg	nundy nun	nhers ¹³⁵
	2016	2,600	481	785	356	256	184	181	178	175	172				49
	4	2,668	447	778	336	291	33	32	32	31	32	_	= Stand	lard Devia	tions 109
	2017	2,819	520	849	385	277	199	196	192	189	186	105	34	3,190	r, <mark>1</mark> 35
		2,826	472	712	161	49	36	35	35	34	35	35	29	1,214	1,214
	2018	3,086	572	934	424	304	219	215	212	208	205	202	60	6,797	8,694
		3,144	563	24	79	55	41	40	39	39	39	40	32	1,378	1,378
	2019	3,503	697	^		074	007	262	258	254	250	246	73	9,428	10,123
	2013	3,439	695	_	Blue n	umbe	rs =	50	49	49	49	50	39	1,784	1,784
	2020	4,038	789		Observ	ved losses		297	292	288	283	279	83	11,475	11,475
	2020	340	151	_			5363	59	59	58	58	59	45	2,161	2,161
		-		2021	2022	2023	2024	2025	2026	2027	2028	2029	2049	Total Reserve	Total Ultimate
	Cal. Per.			3,727	2,810	2,574	2,507	2,584	2,682	2,807	2,961	3,148	83	69,533	93,355
	Total		[342	234	223	246	295	355	425	508	604	45	14,438	14,438 🗸
	<	<													>
1						1 Un	it = \$1,00	00; Foreca	st Scenario	o: Reasona	ble w/ F				

The scenario above for year end 2019 includes projections for the future accident year 2020. Various aggregations are created for different currency groups as well as for the whole company.

An example of a reinsurance structure comprising four different types of contracts

Distributions can be obtained for an Insurer holding a mix of different contract types over the Accident/Underwriting periods included in a forecast.

- Retrospective reinsurance historical periods for which the insurer is now proposing to purchase reinsurance.
- Legacy reinsurance contracts already in place whose results are being monitored.
- Prospective reinsurance proposed contracts on future periods.
- No reinsurance these periods are included to round out the Insurer's position net of Reinsurance.

In the example below the current year is 2019 and the forecast has been set up to cover the years 2009-2020. The four contract types are shown in the order listed above.

Choose Forecast Comb	ination Aggregate	-			
Available Acc Periods		Contra	icts		
Acc Periods 2009 2010 2011 2011 2011 2013 2014 2015 2016 2017 2018 2017 2018 2009 2020	Name C1. Retrospective reinsurance C2. Legacy reinsurance C3. Prospective reinsurance C4. No reinsurance	M1 140,000K 425,000K 100,000K 7,000K	M2 185,000K 475,000K 130,000K	Periods 2015-2019 2011-2014 2020 2009-2010	
Create Contract Output Save Simulations t	Modify Contract	Simu Num	lations ber Jse Fixed Seed	50 000	

Mixtures of quota share (QS), discounting and inflation scenarios can be customized to each contract to further detail the Insurer's and Reinsurer's risk profiles.

Reinsurance scenarios can be run for any aggregate defined in a forecast scenario. Multiple LoBs can be included and Accident/Underwriting periods need not be consecutive. Attachment points for Legacy Reinsurance contracts are adjusted by their respective Paid To Date (PTD).

Sample statistics by calendar year are shown for the undiscounted distributions by calendar year, along with the Insurer, Reinsurer, and Retrocessionaire (if present) after any inflation, discounting, and quota share allocations. Risk capital requirements can be compared with the risk capital for the entire portfolio to assess the cost benefit of the Reinsurance (in respect of risk capital efficiency).



Loss distributions, risk capital calculations, (V@Rs and T-V@Rs), and other metrics are calculated for the aggregate of all contracts - including those where Reinsurance does not apply allowing an accurate view of the Insurer's position net of Reinsurance.



The same metrics are available for the three individual contracts: Retrospective (C1), Legacy (C2) and Prospective (C3).

Mitigate model specification risk and see your business in a new light?

Insureware's platform

can be implemented enterprise-wide in a few days and gives you:

- Long tail liability Enterprise Risk Management
- Unparalleled insight and intelligence
- High powered analytics at ludicrous speed
- Structured databases for managing all risks
- ORSA and Solvency II metrics including the Economic Balance Sheet for the aggregate of multiple LoBs
- Single composite model for multiple LoBs
- Multiple aggregation at different levels of segmentation
- Reserve, pricing and reinsurance risk assessments
- · Liability distributions and correlations by calendar year
- Risk capital allocation by LoB and calendar year
- Reserve Risk net of reinsurance contracts
- · Graphical displays of identified models
 - Trends in three directions
 - Volatility about trends
 - Correlations
- Comprehensive model identification and validation tools
- Creative solutions for insoluble problems within a robust, yet flexible, framework
- ... and much more!

Insureware Innovative Statistical Solutions for P&C Insurance



About Insureware

Insureware is not your typical long-tail liability risk management firm: we are R&D focused. Our team of world-class statisticians originated many of the ideas that the industry now aspires to. They have published numerous papers not only in actuarial journals but also in preeminent statistical journals. Insureware creates and supports the only comprehensive, enterprise wide, long-tail liability risk management software in the world.

Insureware has advised on a wide-range of insurance matters including:

- Reserve due diligence;
- Mergers and Acquisitions;
- Assessing risk capital and Solvency II capital requirements for submissions to regulators and rating agencies;
- Underwriting and pricing; and
- Reinsurance transactions.

Insureware creates unique collaborative partnerships with each client. The partnership facilitates the growth of incomparable knowledge, benefits, and applications.

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