Simple Reserve Report Example

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Abstract

This document demonstrates how a very simple actuarial reserve report could be created using R. This document is only for display purposes. It was created using insurance loss data freely available on the CAS website. This report could be greatly improved by having better documentation for the relationships among tables. I am just getting started with LaTeX and will have more clearly documented reports in subsequent examples.

Purpose

Ractuary was requested by Nsure Ance Company (NAC) to provide a reserve estimate for their workers' compensation loss and alocated loss adjustment expense (ALAE) reserves. Losses are evaluated as of December 31, 1997...

Background

NAC began offering workers' compensation coverage in 1988. Each policy is written on a calendar year basis (i.e. beginning January 1 and ending December 31). NAC has never purchased reinsurense coverage...

Other Stuff

Blah blah...

Conclusions

A summary of our reserve analysis is as follows:

	Paid	Incurred	Ultimate	Case OS	IBNR	Total OS
1988	125049	133513	138993	8464	5480	13944
1989	147358	161673	167073	14315	5400	19715
1990	187760	210204	216633	22444	6429	28873
1991	213396	244669	252263	31273	7594	38867
1992	213904	253878	261087	39974	7209	47183
1993	193676	251129	253250	57453	2121	59574
1994	151081	202911	209512	51830	6601	58431
1995	111268	174496	211166	63228	36670	99898
1996	66033	143042	174486	77009	31444	108453
1997	25265	125429	179035	100164	53606	153770
Totals	1434790	1900944	2063498	466154	162554	628708

From the table above, estimated ultimate loss & ALAE as of December 31, 1997 is 2,063,498 indicating a total outstanding loss & ALAE of 628,708.2.

Methodology

We used two actuarial projection techniques (paid projection and incurred projection) in creating the final estimated ultimate loss projection. The loss projections use loss experience for the more mature accident years to estimate the development of less mature accident years. See the following exhibits for detail regarding the projections and estimated ultimate loss and ALAE selection.

Exhibits

	Paid Projection	Incurred Projection	Selected Ultimate
1988	143806	134181	138993
1989	171665	162481	167073
1990	222012	211255	216633
1991	258633	245892	252263
1992	267026	255147	261087
1993	253863	252637	253250
1994	213874	205150	209512
1995	244146	178186	211166
1996	195602	153370	174486
1997	202067	156003	179035
Totals	2172694	1954303	2063498

Table 2: Selection of Estimated Ultimate Loss & ALAE

	Paid	LDF	Ultimate
1988	125049	1.15	143806
1989	147358	1.165	171665
1990	187760	1.182	222012
1991	213396	1.212	258633
1992	213904	1.248	267026
1993	193676	1.311	253863
1994	151081	1.416	213874
1995	111268	2.194	244146
1996	66033	2.962	195602
1997	25265	7.998	202067

Table 3: Paid Projection

	1	2	3	4	5	6	7	8	9	10
1988	22190	60834	85104	100151	108812	114967	118790	121558	123492	125049
1989	26542	77798	106407	122422	133359	138599	143029	145712	147358	NA
1990	32977	100494	134886	157758	168991	178065	182787	187760	NA	NA
1991	38604	114428	157103	181322	197411	208804	213396	NA	NA	NA
1992	42466	125820	164776	189045	204377	213904	NA	NA	NA	NA
1993	46447	116764	154897	179419	193676	NA	NA	NA	NA	NA
1994	41368	100344	132021	151081	NA	NA	NA	NA	NA	NA
1995	35719	83216	111268	NA	NA	NA	NA	NA	NA	NA
1996	28746	66033	NA	NA	NA	NA	NA	NA	NA	NA
1997	25265	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4: Paid Triangle

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-Ult.
1988	2.742	1.399	1.177	1.086	1.057	1.033	1.023	1.016	1.013	NA
1989	2.931	1.368	1.151	1.089	1.039	1.032	1.019	1.011	NA	NA
1990	3.047	1.342	1.17	1.071	1.054	1.027	1.027	NA	NA	NA
1991	2.964	1.373	1.154	1.089	1.058	1.022	NA	NA	NA	NA
1992	2.963	1.31	1.147	1.081	1.047	NA	NA	NA	NA	NA
1993	2.514	1.327	1.158	1.079	NA	NA	NA	NA	NA	NA
1994	2.426	1.316	1.144	NA	NA	NA	NA	NA	NA	NA
1995	2.33	1.337	NA	NA	NA	NA	NA	NA	NA	NA
1996	2.297	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simple	2.69	1.346	1.157	1.083	1.051	1.028	1.023	1.014	1.013	NA
Weighted	2.684	1.342	1.156	1.082	1.051	1.027	1.023	1.013	1.013	NA
Selected	2.7	1.35	1.55	1.08	1.05	1.03	1.025	1.015	1.013	1.15

Table 5: Paid Development Factor Triangle

	Incurred	LDF	Ultimate
1988	133513	1.005	134181
1989	161673	1.005	162481
1990	210204	1.005	211255
1991	244669	1.005	245892
1992	253878	1.005	255147
1993	251129	1.006	252637
1994	202911	1.011	205150
1995	174496	1.021	178186
1996	143042	1.072	153370
1997	125429	1.244	156003

	1	2	3	4	5	6	7	8	9	10
1988	91892	120466	129785	134401	134051	134264	134169	133158	133800	133513
1989	117540	160490	163802	162824	164650	163326	161246	161836	161673	NA
1990	155671	210607	208274	211660	209823	208629	208662	210204	NA	NA
1991	189021	251182	253292	247771	244882	245666	244669	NA	NA	NA
1992	229435	289785	268235	255528	252878	253878	NA	NA	NA	NA
1993	251804	259975	245594	251196	251129	NA	NA	NA	NA	NA
1994	212555	212160	206811	202911	NA	NA	NA	NA	NA	NA
1995	178437	181175	174496	NA	NA	NA	NA	NA	NA	NA
1996	151415	143042	NA	NA	NA	NA	NA	NA	NA	NA
1997	125429	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 7: Incurred Triangle

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-Ult.
1988	1.311	1.077	1.036	0.9974	1.002	0.9993	0.9925	1.005	0.9979	NA
1989	1.365	1.021	0.994	1.011	0.992	0.9873	1.004	0.999	NA	NA
1990	1.353	0.9889	1.016	0.9913	0.9943	1	1.007	NA	NA	NA
1991	1.329	1.008	0.9782	0.9883	1.003	0.9959	NA	NA	NA	NA
1992	1.263	0.9256	0.9526	0.9896	1.004	NA	NA	NA	NA	NA
1993	1.032	0.9447	1.023	0.9997	NA	NA	NA	NA	NA	NA
1994	0.9981	0.9748	0.9811	NA	NA	NA	NA	NA	NA	NA
1995	1.015	0.9631	NA	NA	NA	NA	NA	NA	NA	NA
1996	0.9447	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simple	1.179	0.9879	0.9972	0.9963	0.999	0.9957	1.001	1.002	0.9979	NA
Weighted	1.159	0.9789	0.9936	0.9953	0.9995	0.9958	1.002	1.002	0.9979	NA
Selected	1.16	1.05	1.01	1.005	1.001	1	1	1	1	1.005

Table 8: Incurred Development Factor Triangle