

DELAWARE COMPENSATION RATING BUREAU, INC.

Retrospective Test of Trend Projections for Severity Ratios – Limited Losses

Attached is a retrospective test of the predictive accuracy of various trend procedures using severity ratios, i.e., ultimate loss ratios adjusted by dividing out the frequency component. The analysis is limited to Policy Years 1990 through 2001, the years for which frequency data is available.

Results for both indemnity and medical are shown using both linear and exponential fits. All possible combinations of from four to ten data points, which permitted a test of the projected loss ratio three years hence, were used. Our current review trends 2.9167 years beyond the midpoint of the latest available completed policy year (1/1/2003 to 12/1/2005).

Current estimates of policy year ultimate loss ratios are compared with predicted values based on trending through earlier years. The results are available for each of three loss development approaches: incurred, paid-to-20th and the average of the incurred and paid-20th methods.

As an illustration, the incurred loss development approach generated an indemnity severity ratio of 0.4577 for policy year 1998 (page 6b.1). Fitting the severity ratios for policy years 1992 to 1995 using a straight line and projecting that to 1998 yielded a severity ratio of 0.3833 (page 6b.2) which understates our current estimate for 1998 by 0.0744 points (page 6b.3).

Indemnity

Actual Ultimate Limited Severity Ratios

INDEMNITY	Policy Year	Ult Limited Severity Ratio (Avg Pd & Inc)	Ult Limited Severity Ratio (Incur)	Ult Limited Severity Ratio (Pd-20)
	1990	0.3574	0.3558	0.3589
	1991	0.3707	0.3654	0.3758
	1992	0.3582	0.3514	0.3650
	1993	0.3581	0.3564	0.3599
	1994	0.3846	0.3816	0.3877
	1995	0.3623	0.3637	0.3609
	1996	0.4375	0.4382	0.4370
	1997	0.4258	0.4270	0.4246
	1998	0.4577	0.4530	0.4623
	1999	0.5189	0.5168	0.5209
	2000	0.6443	0.6833	0.6053
	2001	0.5890	0.6200	0.5580
	2002	0.6278	0.6488	0.6069

Trend # Years = 3

Indemnity
Linear Fit
Trended Severity Ratios

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.3564	0.3518	0.3614
1991-1994 (4)	1997	0.3866	0.3878	0.3859
1992-1995 (4)	1998	0.3833	0.3912	0.3754
1993-1996 (4)	1999	0.4828	0.4874	0.4784
1994-1997 (4)	2000	0.4920	0.4974	0.4866
1995-1998 (4)	2001	0.5444	0.5360	0.5525
1996-1999 (4)	2002	0.5842	0.5766	0.5914
1990-1994 (5)	1997	0.3867	0.3834	0.3903
1991-1995 (5)	1998	0.3716	0.3771	0.3663
1992-1996 (5)	1999	0.4615	0.4687	0.4546
1993-1997 (5)	2000	0.4878	0.4923	0.4834
1994-1998 (5)	2001	0.5184	0.5158	0.5210
1995-1999 (5)	2002	0.6071	0.6002	0.6138
1990-1995 (6)	1998	0.3756	0.3770	0.3744
1991-1996 (6)	1999	0.4371	0.4431	0.4316
1992-1997 (6)	2000	0.4748	0.4815	0.4681
1993-1998 (6)	2001	0.5138	0.5123	0.5152
1994-1999 (6)	2002	0.5798	0.5766	0.5827
1990-1996 (7)	1999	0.4291	0.4319	0.4266
1991-1997 (7)	2000	0.4556	0.4618	0.4497
1992-1998 (7)	2001	0.5021	0.5036	0.5005
1993-1999 (7)	2002	0.5690	0.5668	0.5710
1990-1997 (8)	2000	0.4477	0.4515	0.4442
1991-1998 (8)	2001	0.4843	0.4864	0.4824
1992-1999 (8)	2002	0.5539	0.5543	0.5533
1990-1998 (9)	2001	0.4753	0.4761	0.4747
1991-1999 (9)	2002	0.5342	0.5352	0.5331
1990-1999 (10)	2002	0.5220	0.5222	0.5219

Indemnity
Linear Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.0811	0.0864	0.0756
1991-1994 (4)	1997	0.0392	0.0392	0.0387
1992-1995 (4)	1998	0.0744	0.0618	0.0869
1993-1996 (4)	1999	0.0361	0.0295	0.0425
1994-1997 (4)	2000	0.1523	0.1859	0.1187
1995-1998 (4)	2001	0.0446	0.0840	0.0055
1996-1999 (4)	2002	0.0436	0.0722	0.0155
1990-1994 (5)	1997	0.0391	0.0436	0.0343
1991-1995 (5)	1998	0.0861	0.0759	0.0960
1992-1996 (5)	1999	0.0574	0.0481	0.0663
1993-1997 (5)	2000	0.1565	0.1910	0.1219
1994-1998 (5)	2001	0.0706	0.1043	0.0370
1995-1999 (5)	2002	0.0207	0.0486	-0.0069
1990-1995 (6)	1998	0.0821	0.0760	0.0879
1991-1996 (6)	1999	0.0818	0.0737	0.0893
1992-1997 (6)	2000	0.1695	0.2018	0.1372
1993-1998 (6)	2001	0.0752	0.1077	0.0428
1994-1999 (6)	2002	0.0480	0.0722	0.0242
1990-1996 (7)	1999	0.0898	0.0849	0.0943
1991-1997 (7)	2000	0.1887	0.2216	0.1556
1992-1998 (7)	2001	0.0869	0.1164	0.0575
1993-1999 (7)	2002	0.0588	0.0820	0.0359
1990-1997 (8)	2000	0.1966	0.2318	0.1611
1991-1998 (8)	2001	0.1047	0.1336	0.0756
1992-1999 (8)	2002	0.0739	0.0945	0.0536
1990-1998 (9)	2001	0.1137	0.1439	0.0833
1991-1999 (9)	2002	0.0936	0.1136	0.0738
1990-1999 (10)	2002	0.1058	0.1266	0.0850

**Indemnity
Exponential Fit
Trended Severity Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.3565	0.3518	0.3614
1991-1994 (4)	1997	0.3864	0.3879	0.3855
1992-1995 (4)	1998	0.3834	0.3922	0.3750
1993-1996 (4)	1999	0.4903	0.4963	0.4847
1994-1997 (4)	2000	0.5013	0.5081	0.4946
1995-1998 (4)	2001	0.5678	0.5571	0.5784
1996-1999 (4)	2002	0.5965	0.5870	0.6055
1990-1994 (5)	1997	0.3867	0.3834	0.3904
1991-1995 (5)	1998	0.3713	0.3771	0.3659
1992-1996 (5)	1999	0.4656	0.4749	0.4568
1993-1997 (5)	2000	0.4976	0.5033	0.4919
1994-1998 (5)	2001	0.5316	0.5290	0.5340
1995-1999 (5)	2002	0.6409	0.6313	0.6503
1990-1995 (6)	1998	0.3755	0.3770	0.3741
1991-1996 (6)	1999	0.4373	0.4444	0.4307
1992-1997 (6)	2000	0.4819	0.4908	0.4734
1993-1998 (6)	2001	0.5275	0.5264	0.5285
1994-1999 (6)	2002	0.6024	0.5989	0.6056
1990-1996 (7)	1999	0.4290	0.4323	0.4260
1991-1997 (7)	2000	0.4587	0.4662	0.4515
1992-1998 (7)	2001	0.5131	0.5163	0.5100
1993-1999 (7)	2002	0.5909	0.5889	0.5927
1990-1997 (8)	2000	0.4499	0.4544	0.4458
1991-1998 (8)	2001	0.4907	0.4942	0.4874
1992-1999 (8)	2002	0.5718	0.5739	0.5697
1990-1998 (9)	2001	0.4803	0.4819	0.4789
1991-1999 (9)	2002	0.5457	0.5484	0.5431
1990-1999 (10)	2002	0.5311	0.5322	0.5300

Indemnity
Exponential Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.0810	0.0864	0.0756
1991-1994 (4)	1997	0.0394	0.0391	0.0391
1992-1995 (4)	1998	0.0743	0.0608	0.0873
1993-1996 (4)	1999	0.0286	0.0205	0.0362
1994-1997 (4)	2000	0.1430	0.1752	0.1107
1995-1998 (4)	2001	0.0212	0.0629	-0.0204
1996-1999 (4)	2002	0.0313	0.0618	0.0014
1990-1994 (5)	1997	0.0391	0.0436	0.0342
1991-1995 (5)	1998	0.0864	0.0759	0.0964
1992-1996 (5)	1999	0.0533	0.0419	0.0641
1993-1997 (5)	2000	0.1467	0.1800	0.1134
1994-1998 (5)	2001	0.0574	0.0910	0.0240
1995-1999 (5)	2002	-0.0131	0.0175	-0.0434
1990-1995 (6)	1998	0.0822	0.0760	0.0882
1991-1996 (6)	1999	0.0816	0.0724	0.0902
1992-1997 (6)	2000	0.1624	0.1925	0.1319
1993-1998 (6)	2001	0.0615	0.0936	0.0295
1994-1999 (6)	2002	0.0254	0.0499	0.0013
1990-1996 (7)	1999	0.0899	0.0845	0.0949
1991-1997 (7)	2000	0.1856	0.2171	0.1538
1992-1998 (7)	2001	0.0759	0.1037	0.0480
1993-1999 (7)	2002	0.0369	0.0599	0.0142
1990-1997 (8)	2000	0.1944	0.2289	0.1595
1991-1998 (8)	2001	0.0983	0.1258	0.0706
1992-1999 (8)	2002	0.0560	0.0749	0.0372
1990-1998 (9)	2001	0.1087	0.1381	0.0791
1991-1999 (9)	2002	0.0821	0.1004	0.0638
1990-1999 (10)	2002	0.0967	0.1166	0.0769

Medical
Actual Ultimate Limited Severity Ratios

MEDICAL	Policy Year	Ult Limited Severity Ratio (Avg Pd & Inc)	Ult Limited Severity Ratio (Incur)	Ult Limited Severity Ratio (Pd-20)
	1990	0.2776	0.2739	0.2814
	1991	0.3093	0.3049	0.3136
	1992	0.3497	0.3447	0.3547
	1993	0.3383	0.3414	0.3352
	1994	0.3654	0.3662	0.3647
	1995	0.3705	0.3758	0.3651
	1996	0.4530	0.4746	0.4312
	1997	0.4779	0.5005	0.4554
	1998	0.5632	0.5801	0.5462
	1999	0.6198	0.6400	0.5995
	2000	0.7479	0.8000	0.6956
	2001	0.7235	0.7656	0.6812
	2002	0.7884	0.8451	0.7316

Medical
Linear Fit
Trended Severity Ratios

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.4189	0.4253	0.4124
1991-1994 (4)	1997	0.4113	0.4206	0.4023
1992-1995 (4)	1998	0.3963	0.4102	0.3822
1993-1996 (4)	1999	0.5389	0.5736	0.5038
1994-1997 (4)	2000	0.6057	0.6550	0.5563
1995-1998 (4)	2001	0.7375	0.7702	0.7049
1996-1999 (4)	2002	0.7920	0.8079	0.7761
1990-1994 (5)	1997	0.4304	0.4368	0.4240
1991-1995 (5)	1998	0.4157	0.4282	0.4032
1992-1996 (5)	1999	0.4948	0.5276	0.4616
1993-1997 (5)	2000	0.5844	0.6250	0.5438
1994-1998 (5)	2001	0.6975	0.7357	0.6592
1995-1999 (5)	2002	0.8013	0.8312	0.7714
1990-1995 (6)	1998	0.4328	0.4429	0.4226
1991-1996 (6)	1999	0.4913	0.5198	0.4627
1992-1997 (6)	2000	0.5481	0.5873	0.5088
1993-1998 (6)	2001	0.6708	0.7062	0.6352
1994-1999 (6)	2002	0.7696	0.8050	0.7340
1990-1996 (7)	1999	0.4943	0.5185	0.4699
1991-1997 (7)	2000	0.5401	0.5757	0.5046
1992-1998 (7)	2001	0.6327	0.6689	0.5964
1993-1999 (7)	2002	0.7442	0.7787	0.7095
1990-1997 (8)	2000	0.5387	0.5703	0.5071
1991-1998 (8)	2001	0.6176	0.6520	0.5830
1992-1999 (8)	2002	0.7080	0.7440	0.6719
1990-1998 (9)	2001	0.6096	0.6415	0.5776
1991-1999 (9)	2002	0.6899	0.7250	0.6547
1990-1999 (10)	2002	0.6783	0.7116	0.6448

Medical**Linear Fit****Differences: (Actual - Trended)**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.0341	0.0493	0.0188
1991-1994 (4)	1997	0.0666	0.0799	0.0531
1992-1995 (4)	1998	0.1670	0.1699	0.1640
1993-1996 (4)	1999	0.0809	0.0664	0.0957
1994-1997 (4)	2000	0.1422	0.1450	0.1393
1995-1998 (4)	2001	-0.0140	-0.0046	-0.0237
1996-1999 (4)	2002	-0.0036	0.0372	-0.0445
1990-1994 (5)	1997	0.0475	0.0637	0.0314
1991-1995 (5)	1998	0.1475	0.1519	0.1430
1992-1996 (5)	1999	0.1250	0.1124	0.1379
1993-1997 (5)	2000	0.1635	0.1750	0.1518
1994-1998 (5)	2001	0.0260	0.0299	0.0220
1995-1999 (5)	2002	-0.0129	0.0139	-0.0398
1990-1995 (6)	1998	0.1304	0.1372	0.1236
1991-1996 (6)	1999	0.1285	0.1202	0.1368
1992-1997 (6)	2000	0.1998	0.2127	0.1868
1993-1998 (6)	2001	0.0527	0.0594	0.0460
1994-1999 (6)	2002	0.0188	0.0401	-0.0024
1990-1996 (7)	1999	0.1255	0.1215	0.1296
1991-1997 (7)	2000	0.2078	0.2243	0.1910
1992-1998 (7)	2001	0.0908	0.0967	0.0848
1993-1999 (7)	2002	0.0442	0.0664	0.0221
1990-1997 (8)	2000	0.2092	0.2297	0.1885
1991-1998 (8)	2001	0.1059	0.1136	0.0982
1992-1999 (8)	2002	0.0804	0.1011	0.0597
1990-1998 (9)	2001	0.1139	0.1241	0.1036
1991-1999 (9)	2002	0.0985	0.1201	0.0769
1990-1999 (10)	2002	0.1101	0.1335	0.0868

**Medical
Exponential Fit
Trended Severity Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.4382	0.4480	0.4284
1991-1994 (4)	1997	0.4196	0.4317	0.4082
1992-1995 (4)	1998	0.3982	0.4137	0.3831
1993-1996 (4)	1999	0.5664	0.6099	0.5235
1994-1997 (4)	2000	0.6507	0.7201	0.5849
1995-1998 (4)	2001	0.8312	0.8779	0.7853
1996-1999 (4)	2002	0.8620	0.8720	0.8527
1990-1994 (5)	1997	0.4495	0.4591	0.4402
1991-1995 (5)	1998	0.4236	0.4392	0.4086
1992-1996 (5)	1999	0.5061	0.5456	0.4680
1993-1997 (5)	2000	0.6251	0.6792	0.5728
1994-1998 (5)	2001	0.7704	0.8272	0.7151
1995-1999 (5)	2002	0.9124	0.9525	0.8726
1990-1995 (6)	1998	0.4502	0.4641	0.4366
1991-1996 (6)	1999	0.5079	0.5434	0.4736
1992-1997 (6)	2000	0.5719	0.6223	0.5236
1993-1998 (6)	2001	0.7364	0.7870	0.6867
1994-1999 (6)	2002	0.8670	0.9198	0.8151
1990-1996 (7)	1999	0.5206	0.5520	0.4898
1991-1997 (7)	2000	0.5674	0.6140	0.5228
1992-1998 (7)	2001	0.6766	0.7276	0.6272
1993-1999 (7)	2002	0.8350	0.8858	0.7850
1990-1997 (8)	2000	0.5748	0.6174	0.5337
1991-1998 (8)	2001	0.6622	0.7115	0.6148
1992-1999 (8)	2002	0.7753	0.8286	0.7235
1990-1998 (9)	2001	0.6620	0.7084	0.6170
1991-1999 (9)	2002	0.7559	0.8088	0.7048
1990-1999 (10)	2002	0.7509	0.8020	0.7014

Medical
Exponential Fit
Differences: (Actual - Trended)

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1990-1993 (4)	1996	0.0148	0.0266	0.0028
1991-1994 (4)	1997	0.0583	0.0688	0.0472
1992-1995 (4)	1998	0.1650	0.1664	0.1631
1993-1996 (4)	1999	0.0534	0.0301	0.0760
1994-1997 (4)	2000	0.0972	0.0799	0.1107
1995-1998 (4)	2001	-0.1077	-0.1123	-0.1041
1996-1999 (4)	2002	-0.0736	-0.0269	-0.1211
1990-1994 (5)	1997	0.0284	0.0414	0.0152
1991-1995 (5)	1998	0.1396	0.1409	0.1376
1992-1996 (5)	1999	0.1137	0.0944	0.1315
1993-1997 (5)	2000	0.1228	0.1208	0.1228
1994-1998 (5)	2001	-0.0469	-0.0616	-0.0339
1995-1999 (5)	2002	-0.1240	-0.1074	-0.1410
1990-1995 (6)	1998	0.1130	0.1160	0.1096
1991-1996 (6)	1999	0.1119	0.0966	0.1259
1992-1997 (6)	2000	0.1760	0.1777	0.1720
1993-1998 (6)	2001	-0.0129	-0.0214	-0.0055
1994-1999 (6)	2002	-0.0786	-0.0747	-0.0835
1990-1996 (7)	1999	0.0992	0.0880	0.1097
1991-1997 (7)	2000	0.1805	0.1860	0.1728
1992-1998 (7)	2001	0.0469	0.0380	0.0540
1993-1999 (7)	2002	-0.0466	-0.0407	-0.0534
1990-1997 (8)	2000	0.1731	0.1826	0.1619
1991-1998 (8)	2001	0.0613	0.0541	0.0664
1992-1999 (8)	2002	0.0131	0.0165	0.0081
1990-1998 (9)	2001	0.0615	0.0572	0.0642
1991-1999 (9)	2002	0.0325	0.0363	0.0268
1990-1999 (10)	2002	0.0375	0.0431	0.0302