

DELAWARE COMPENSATION RATING BUREAU, INC.

Retrospective Test of Trend Projections for Severity Ratios – Unlimited 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 1995 through 2007, 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 (1/1/2008 to 12/1/2010).

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-20<sup>th</sup> and the average of the incurred and paid-20<sup>th</sup> methods.

As an illustration, the incurred loss development approach generated an indemnity severity ratio of 0.8034 for policy year 2002 (page 6.1). Fitting the severity ratios for policy years 1996 to 1999 using a straight line and projecting that to 2002 yielded a severity ratio of 0.7202 (page 6.2) which understates our current estimate for 2002 by 0.0832 points (page 6.3).

**Indemnity  
Actual Ultimate Severity Ratios**

INDEMNITY	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
	1995	0.4469	0.4406	0.4533
	1996	0.5124	0.5062	0.5187
	1997	0.5872	0.6034	0.5709
	1998	0.5808	0.5709	0.5908
	1999	0.6422	0.6238	0.6606
	2000	0.8584	0.8559	0.8607
	2001	0.7414	0.7312	0.7518
	2002	0.7972	0.8034	0.7911
	2003	0.7677	0.7565	0.7788
	2004	0.7639	0.7656	0.7623
	2005	0.7609	0.7581	0.7636
	2006	0.7141	0.7154	0.7127
	2007	0.8008	0.7972	0.8042

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)
1995-1998 (4)	2001	0.7463	0.7499	0.7425
1996-1999 (4)	2002	0.7530	0.7202	0.7858
1997-2000 (4)	2003	1.0609	1.0282	1.0934
1998-2001 (4)	2004	1.0198	1.0163	1.0234
1999-2002 (4)	2005	0.9164	0.9399	0.8932
2000-2003 (4)	2006	0.6938	0.6851	0.7027
2001-2004 (4)	2007	0.7847	0.7895	0.7796
1995-1999 (5)	2002	0.7834	0.7645	0.8022
1996-2000 (5)	2003	1.0097	0.9919	1.0272
1997-2001 (5)	2004	0.9750	0.9473	1.0028
1998-2002 (5)	2005	0.9900	1.0032	0.9769
1999-2003 (5)	2006	0.8563	0.8606	0.8520
2000-2004 (5)	2007	0.7044	0.7049	0.7040
1995-2000 (6)	2003	0.9882	0.9768	0.9993
1996-2001 (6)	2004	0.9712	0.9527	0.9897
1997-2002 (6)	2005	0.9759	0.9673	0.9847
1998-2003 (6)	2006	0.9328	0.9345	0.9311
1999-2004 (6)	2007	0.8234	0.8320	0.8150
1995-2001 (7)	2004	0.9736	0.9599	0.9872
1996-2002 (7)	2005	0.9829	0.9776	0.9883
1997-2003 (7)	2006	0.9407	0.9275	0.9540
1998-2004 (7)	2007	0.8943	0.9004	0.8883
1995-2002 (8)	2005	0.9919	0.9882	0.9956
1996-2003 (8)	2006	0.9595	0.9495	0.9694
1997-2004 (8)	2007	0.9123	0.9055	0.9192
1995-2003 (9)	2006	0.9771	0.9692	0.9850
1996-2004 (9)	2007	0.9372	0.9322	0.9422
1995-2004 (10)	2007	0.9602	0.9562	0.9642

**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)
1995-1998 (4)	2001	-0.0049	-0.0187	0.0093
1996-1999 (4)	2002	0.0442	0.0832	0.0053
1997-2000 (4)	2003	-0.2932	-0.2717	-0.3146
1998-2001 (4)	2004	-0.2559	-0.2507	-0.2611
1999-2002 (4)	2005	-0.1555	-0.1818	-0.1296
2000-2003 (4)	2006	0.0203	0.0304	0.0100
2001-2004 (4)	2007	0.0161	0.0077	0.0246
1995-1999 (5)	2002	0.0138	0.0389	-0.0111
1996-2000 (5)	2003	-0.2420	-0.2354	-0.2484
1997-2001 (5)	2004	-0.2111	-0.1817	-0.2405
1998-2002 (5)	2005	-0.2291	-0.2451	-0.2133
1999-2003 (5)	2006	-0.1422	-0.1452	-0.1393
2000-2004 (5)	2007	0.0964	0.0923	0.1002
1995-2000 (6)	2003	-0.2205	-0.2203	-0.2205
1996-2001 (6)	2004	-0.2073	-0.1871	-0.2274
1997-2002 (6)	2005	-0.2150	-0.2092	-0.2211
1998-2003 (6)	2006	-0.2187	-0.2191	-0.2184
1999-2004 (6)	2007	-0.0226	-0.0348	-0.0108
1995-2001 (7)	2004	-0.2097	-0.1943	-0.2249
1996-2002 (7)	2005	-0.2220	-0.2195	-0.2247
1997-2003 (7)	2006	-0.2266	-0.2121	-0.2413
1998-2004 (7)	2007	-0.0935	-0.1032	-0.0841
1995-2002 (8)	2005	-0.2310	-0.2301	-0.2320
1996-2003 (8)	2006	-0.2454	-0.2341	-0.2567
1997-2004 (8)	2007	-0.1115	-0.1083	-0.1150
1995-2003 (9)	2006	-0.2630	-0.2538	-0.2723
1996-2004 (9)	2007	-0.1364	-0.1350	-0.1380
1995-2004 (10)	2007	-0.1594	-0.1590	-0.1600

**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)
1995-1998 (4)	2001	0.8006	0.8084	0.7923
1996-1999 (4)	2002	0.7812	0.7427	0.8207
1997-2000 (4)	2003	1.1503	1.0925	1.2112
1998-2001 (4)	2004	1.1059	1.1064	1.1056
1999-2002 (4)	2005	0.9470	0.9810	0.9152
2000-2003 (4)	2006	0.7020	0.6935	0.7104
2001-2004 (4)	2007	0.7855	0.7909	0.7799
1995-1999 (5)	2002	0.8409	0.8189	0.8623
1996-2000 (5)	2003	1.0972	1.0693	1.1250
1997-2001 (5)	2004	1.0350	0.9933	1.0790
1998-2002 (5)	2005	1.0571	1.0801	1.0351
1999-2003 (5)	2006	0.8732	0.8812	0.8655
2000-2004 (5)	2007	0.7106	0.7109	0.7104
1995-2000 (6)	2003	1.0979	1.0824	1.1126
1996-2001 (6)	2004	1.0462	1.0200	1.0731
1997-2002 (6)	2005	1.0353	1.0206	1.0509
1998-2003 (6)	2006	0.9769	0.9827	0.9711
1999-2004 (6)	2007	0.8347	0.8464	0.8235
1995-2001 (7)	2004	1.0764	1.0585	1.0942
1996-2002 (7)	2005	1.0601	1.0522	1.0682
1997-2003 (7)	2006	0.9873	0.9686	1.0066
1998-2004 (7)	2007	0.9257	0.9361	0.9155
1995-2002 (8)	2005	1.0980	1.0941	1.1017
1996-2003 (8)	2006	1.0255	1.0123	1.0388
1997-2004 (8)	2007	0.9493	0.9399	0.9592
1995-2003 (9)	2006	1.0724	1.0629	1.0817
1996-2004 (9)	2007	0.9931	0.9870	0.9995
1995-2004 (10)	2007	1.0444	1.0407	1.0481

**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)
1995-1998 (4)	2001	-0.0592	-0.0772	-0.0405
1996-1999 (4)	2002	0.0160	0.0607	-0.0296
1997-2000 (4)	2003	-0.3826	-0.3360	-0.4324
1998-2001 (4)	2004	-0.3420	-0.3408	-0.3433
1999-2002 (4)	2005	-0.1861	-0.2229	-0.1516
2000-2003 (4)	2006	0.0121	0.0219	0.0023
2001-2004 (4)	2007	0.0153	0.0063	0.0243
1995-1999 (5)	2002	-0.0437	-0.0155	-0.0712
1996-2000 (5)	2003	-0.3295	-0.3128	-0.3462
1997-2001 (5)	2004	-0.2711	-0.2277	-0.3167
1998-2002 (5)	2005	-0.2962	-0.3220	-0.2715
1999-2003 (5)	2006	-0.1591	-0.1658	-0.1528
2000-2004 (5)	2007	0.0902	0.0863	0.0938
1995-2000 (6)	2003	-0.3302	-0.3259	-0.3338
1996-2001 (6)	2004	-0.2823	-0.2544	-0.3108
1997-2002 (6)	2005	-0.2744	-0.2625	-0.2873
1998-2003 (6)	2006	-0.2628	-0.2673	-0.2584
1999-2004 (6)	2007	-0.0339	-0.0492	-0.0193
1995-2001 (7)	2004	-0.3125	-0.2929	-0.3319
1996-2002 (7)	2005	-0.2992	-0.2941	-0.3046
1997-2003 (7)	2006	-0.2732	-0.2532	-0.2939
1998-2004 (7)	2007	-0.1249	-0.1389	-0.1113
1995-2002 (8)	2005	-0.3371	-0.3360	-0.3381
1996-2003 (8)	2006	-0.3114	-0.2969	-0.3261
1997-2004 (8)	2007	-0.1485	-0.1427	-0.1550
1995-2003 (9)	2006	-0.3583	-0.3475	-0.3690
1996-2004 (9)	2007	-0.1923	-0.1898	-0.1953
1995-2004 (10)	2007	-0.2436	-0.2435	-0.2439

**Medical**  
**Actual Ultimate Severity Ratios**

MEDICAL	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
	1995	0.5520	0.5717	0.5324
	1996	0.5969	0.6125	0.5814
	1997	0.6780	0.7062	0.6498
	1998	0.7719	0.7726	0.7713
	1999	0.8965	0.9285	0.8643
	2000	1.1867	1.2979	1.0755
	2001	1.0620	1.1338	0.9901
	2002	1.2598	1.3282	1.1913
	2003	1.2579	1.3184	1.1974
	2004	1.4371	1.5526	1.3216
	2005	1.4348	1.5001	1.3693
	2006	1.3475	1.3603	1.3348
	2007	1.6085	1.6609	1.5563

**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)
1995-1998 (4)	2001	0.9831	0.9791	0.9870
1996-1999 (4)	2002	1.1825	1.2114	1.1533
1997-2000 (4)	2003	1.6261	1.7953	1.4568
1998-2001 (4)	2004	1.5015	1.6871	1.3157
1999-2002 (4)	2005	1.5356	1.6379	1.4333
2000-2003 (4)	2006	1.3767	1.3847	1.3687
2001-2004 (4)	2007	1.7597	1.8942	1.6254
1995-1999 (5)	2002	1.1311	1.1552	1.1067
1996-2000 (5)	2003	1.5251	1.6601	1.3898
1997-2001 (5)	2004	1.5104	1.6581	1.3626
1998-2002 (5)	2005	1.6060	1.7505	1.4614
1999-2003 (5)	2006	1.5305	1.6064	1.4547
2000-2004 (5)	2007	1.5891	1.6732	1.5049
1995-2000 (6)	2003	1.4350	1.5449	1.3250
1996-2001 (6)	2004	1.4902	1.6216	1.3585
1997-2002 (6)	2005	1.6153	1.7449	1.4855
1998-2003 (6)	2006	1.6060	1.7214	1.4905
1999-2004 (6)	2007	1.6727	1.7905	1.5551
1995-2001 (7)	2004	1.4480	1.5632	1.3326
1996-2002 (7)	2005	1.6013	1.7244	1.4779
1997-2003 (7)	2006	1.6335	1.7450	1.5218
1998-2004 (7)	2007	1.7227	1.8653	1.5801
1995-2002 (8)	2005	1.5665	1.6798	1.4531
1996-2003 (8)	2006	1.6367	1.7477	1.5254
1997-2004 (8)	2007	1.7426	1.8795	1.6057
1995-2003 (9)	2006	1.6174	1.7233	1.5113
1996-2004 (9)	2007	1.7445	1.8789	1.6101
1995-2004 (10)	2007	1.7273	1.8555	1.5989



**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)
1995-1998 (4)	2001	0.0789	0.1547	0.0031
1996-1999 (4)	2002	0.0773	0.1168	0.0380
1997-2000 (4)	2003	-0.3682	-0.4769	-0.2594
1998-2001 (4)	2004	-0.0644	-0.1345	0.0059
1999-2002 (4)	2005	-0.1008	-0.1378	-0.0640
2000-2003 (4)	2006	-0.0292	-0.0244	-0.0339
2001-2004 (4)	2007	-0.1512	-0.2333	-0.0691
1995-1999 (5)	2002	0.1287	0.1731	0.0846
1996-2000 (5)	2003	-0.2672	-0.3417	-0.1924
1997-2001 (5)	2004	-0.0733	-0.1055	-0.0410
1998-2002 (5)	2005	-0.1712	-0.2504	-0.0921
1999-2003 (5)	2006	-0.1830	-0.2461	-0.1199
2000-2004 (5)	2007	0.0195	-0.0123	0.0514
1995-2000 (6)	2003	-0.1771	-0.2265	-0.1276
1996-2001 (6)	2004	-0.0531	-0.0690	-0.0369
1997-2002 (6)	2005	-0.1805	-0.2448	-0.1162
1998-2003 (6)	2006	-0.2585	-0.3611	-0.1557
1999-2004 (6)	2007	-0.0642	-0.1296	0.0012
1995-2001 (7)	2004	-0.0109	-0.0106	-0.0110
1996-2002 (7)	2005	-0.1665	-0.2243	-0.1086
1997-2003 (7)	2006	-0.2860	-0.3847	-0.1870
1998-2004 (7)	2007	-0.1142	-0.2044	-0.0238
1995-2002 (8)	2005	-0.1317	-0.1797	-0.0838
1996-2003 (8)	2006	-0.2892	-0.3874	-0.1906
1997-2004 (8)	2007	-0.1341	-0.2186	-0.0494
1995-2003 (9)	2006	-0.2699	-0.3630	-0.1765
1996-2004 (9)	2007	-0.1360	-0.2180	-0.0538
1995-2004 (10)	2007	-0.1188	-0.1946	-0.0426

**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)
1995-1998 (4)	2001	1.0731	1.0585	1.0883
1996-1999 (4)	2002	1.3355	1.3628	1.3069
1997-2000 (4)	2003	1.9673	2.2244	1.7169
1998-2001 (4)	2004	1.6866	1.9780	1.4188
1999-2002 (4)	2005	1.6447	1.7709	1.5204
2000-2003 (4)	2006	1.3888	1.3896	1.3947
2001-2004 (4)	2007	1.8747	2.0188	1.7301
1995-1999 (5)	2002	1.2714	1.2907	1.2511
1996-2000 (5)	2003	1.8341	2.0257	1.6430
1997-2001 (5)	2004	1.7484	1.9622	1.5413
1998-2002 (5)	2005	1.8101	2.0326	1.5986
1999-2003 (5)	2006	1.6243	1.7102	1.5397
2000-2004 (5)	2007	1.6274	1.7022	1.5535
1995-2000 (6)	2003	1.7004	1.8398	1.5583
1996-2001 (6)	2004	1.7622	1.9522	1.5752
1997-2002 (6)	2005	1.8817	2.0712	1.6965
1998-2003 (6)	2006	1.7870	1.9539	1.6257
1999-2004 (6)	2007	1.7907	1.9250	1.6573
1995-2001 (7)	2004	1.7183	1.8753	1.5613
1996-2002 (7)	2005	1.9134	2.0964	1.7331
1997-2003 (7)	2006	1.8856	2.0430	1.7308
1998-2004 (7)	2007	1.9262	2.1265	1.7323
1995-2002 (8)	2005	1.8886	2.0502	1.7274
1996-2003 (8)	2006	1.9477	2.1099	1.7872
1997-2004 (8)	2007	2.0207	2.2132	1.8319
1995-2003 (9)	2006	1.9545	2.1061	1.8032
1996-2004 (9)	2007	2.0879	2.2849	1.8939
1995-2004 (10)	2007	2.1052	2.2920	1.9200

**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)
1995-1998 (4)	2001	-0.0111	0.0753	-0.0982
1996-1999 (4)	2002	-0.0757	-0.0346	-0.1156
1997-2000 (4)	2003	-0.7094	-0.9060	-0.5195
1998-2001 (4)	2004	-0.2495	-0.4254	-0.0972
1999-2002 (4)	2005	-0.2099	-0.2708	-0.1511
2000-2003 (4)	2006	-0.0413	-0.0293	-0.0599
2001-2004 (4)	2007	-0.2662	-0.3579	-0.1738
1995-1999 (5)	2002	-0.0116	0.0375	-0.0598
1996-2000 (5)	2003	-0.5762	-0.7073	-0.4456
1997-2001 (5)	2004	-0.3113	-0.4096	-0.2197
1998-2002 (5)	2005	-0.3753	-0.5325	-0.2293
1999-2003 (5)	2006	-0.2768	-0.3499	-0.2049
2000-2004 (5)	2007	-0.0189	-0.0413	0.0028
1995-2000 (6)	2003	-0.4425	-0.5214	-0.3609
1996-2001 (6)	2004	-0.3251	-0.3996	-0.2536
1997-2002 (6)	2005	-0.4469	-0.5711	-0.3272
1998-2003 (6)	2006	-0.4395	-0.5936	-0.2909
1999-2004 (6)	2007	-0.1822	-0.2641	-0.1010
1995-2001 (7)	2004	-0.2812	-0.3227	-0.2397
1996-2002 (7)	2005	-0.4786	-0.5963	-0.3638
1997-2003 (7)	2006	-0.5381	-0.6827	-0.3960
1998-2004 (7)	2007	-0.3177	-0.4656	-0.1760
1995-2002 (8)	2005	-0.4538	-0.5501	-0.3581
1996-2003 (8)	2006	-0.6002	-0.7496	-0.4524
1997-2004 (8)	2007	-0.4122	-0.5523	-0.2756
1995-2003 (9)	2006	-0.6070	-0.7458	-0.4684
1996-2004 (9)	2007	-0.4794	-0.6240	-0.3376
1995-2004 (10)	2007	-0.4967	-0.6311	-0.3637