

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 1994 through 2006, 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 (1/1/2007 to 12/1/2009).

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 0.5686 for policy year 2001 (page 6.1). Fitting the severity ratios for policy years 1995 to 1998 using a straight line and projecting that to 2001 yielded a severity ratio of 0.5562 (page 6.2) which understates our current estimate for 2001 by 0.0124 points (page 6.3).

**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)
	1994	0.3299	0.3288	0.3310
	1995	0.3305	0.3260	0.3349
	1996	0.3900	0.3877	0.3924
	1997	0.4350	0.4416	0.4285
	1998	0.4278	0.4270	0.4289
	1999	0.4831	0.4806	0.4854
	2000	0.6421	0.6479	0.6363
	2001	0.5647	0.5686	0.5611
	2002	0.5699	0.5777	0.5622
	2003	0.5838	0.5826	0.5852
	2004	0.5777	0.5806	0.5749
	2005	0.5668	0.5787	0.5548
	2006	0.5851	0.5841	0.5858

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)
1994-1997 (4)	2000	0.5400	0.5511	0.5292
1995-1998 (4)	2001	0.5474	0.5562	0.5393
1996-1999 (4)	2002	0.5564	0.5531	0.5595
1997-2000 (4)	2003	0.8015	0.8019	0.8007
1998-2001 (4)	2004	0.7858	0.7975	0.7743
1999-2002 (4)	2005	0.6473	0.6641	0.6311
2000-2003 (4)	2006	0.5138	0.5101	0.5177
1994-1998 (5)	2001	0.5328	0.5382	0.5278
1995-1999 (5)	2002	0.5848	0.5868	0.5828
1996-2000 (5)	2003	0.7518	0.7567	0.7467
1997-2001 (5)	2004	0.7474	0.7506	0.7443
1998-2002 (5)	2005	0.7204	0.7351	0.7059
1999-2003 (5)	2006	0.6333	0.6384	0.6288
1994-1999 (6)	2002	0.5727	0.5740	0.5715
1995-2000 (6)	2003	0.7390	0.7462	0.7318
1996-2001 (6)	2004	0.7340	0.7400	0.7282
1997-2002 (6)	2005	0.7160	0.7239	0.7082
1998-2003 (6)	2006	0.6966	0.7030	0.6904
1994-2000 (7)	2003	0.7083	0.7140	0.7025
1995-2001 (7)	2004	0.7365	0.7443	0.7289
1996-2002 (7)	2005	0.7190	0.7284	0.7097
1997-2003 (7)	2006	0.7035	0.7064	0.7009
1994-2001 (8)	2004	0.7192	0.7259	0.7127
1995-2002 (8)	2005	0.7300	0.7405	0.7197
1996-2003 (8)	2006	0.7133	0.7183	0.7085
1994-2002 (9)	2005	0.7221	0.7314	0.7129
1995-2003 (9)	2006	0.7283	0.7350	0.7219
1994-2003 (10)	2006	0.7262	0.7324	0.7201

**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)
1994-1997 (4)	2000	0.1021	0.0968	0.1071
1995-1998 (4)	2001	0.0173	0.0124	0.0218
1996-1999 (4)	2002	0.0135	0.0246	0.0027
1997-2000 (4)	2003	-0.2177	-0.2193	-0.2155
1998-2001 (4)	2004	-0.2081	-0.2169	-0.1994
1999-2002 (4)	2005	-0.0805	-0.0854	-0.0763
2000-2003 (4)	2006	0.0713	0.0740	0.0681
1994-1998 (5)	2001	0.0319	0.0304	0.0333
1995-1999 (5)	2002	-0.0149	-0.0091	-0.0206
1996-2000 (5)	2003	-0.1680	-0.1741	-0.1615
1997-2001 (5)	2004	-0.1697	-0.1700	-0.1694
1998-2002 (5)	2005	-0.1536	-0.1564	-0.1511
1999-2003 (5)	2006	-0.0482	-0.0543	-0.0430
1994-1999 (6)	2002	-0.0028	0.0037	-0.0093
1995-2000 (6)	2003	-0.1552	-0.1636	-0.1466
1996-2001 (6)	2004	-0.1563	-0.1594	-0.1533
1997-2002 (6)	2005	-0.1492	-0.1452	-0.1534
1998-2003 (6)	2006	-0.1115	-0.1189	-0.1046
1994-2000 (7)	2003	-0.1245	-0.1314	-0.1173
1995-2001 (7)	2004	-0.1588	-0.1637	-0.1540
1996-2002 (7)	2005	-0.1522	-0.1497	-0.1549
1997-2003 (7)	2006	-0.1184	-0.1223	-0.1151
1994-2001 (8)	2004	-0.1415	-0.1453	-0.1378
1995-2002 (8)	2005	-0.1632	-0.1618	-0.1649
1996-2003 (8)	2006	-0.1282	-0.1342	-0.1227
1994-2002 (9)	2005	-0.1553	-0.1527	-0.1581
1995-2003 (9)	2006	-0.1432	-0.1509	-0.1361
1994-2003 (10)	2006	-0.1411	-0.1483	-0.1343

**Indemnity  
Exponential Fit  
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1994-1997 (4)	2000	0.5771	0.5926	0.5623
1995-1998 (4)	2001	0.5856	0.5997	0.5728
1996-1999 (4)	2002	0.5734	0.5699	0.5767
1997-2000 (4)	2003	0.8758	0.8711	0.8801
1998-2001 (4)	2004	0.8651	0.8829	0.8476
1999-2002 (4)	2005	0.6631	0.6836	0.6437
2000-2003 (4)	2006	0.5204	0.5178	0.5233
1994-1998 (5)	2001	0.5652	0.5731	0.5580
1995-1999 (5)	2002	0.6277	0.6329	0.6227
1996-2000 (5)	2003	0.8125	0.8182	0.8064
1997-2001 (5)	2004	0.8019	0.8036	0.8005
1998-2002 (5)	2005	0.7666	0.7867	0.7468
1999-2003 (5)	2006	0.6448	0.6512	0.6390
1994-1999 (6)	2002	0.6131	0.6161	0.6102
1995-2000 (6)	2003	0.8215	0.8339	0.8092
1996-2001 (6)	2004	0.7914	0.7990	0.7838
1997-2002 (6)	2005	0.7585	0.7672	0.7499
1998-2003 (6)	2006	0.7311	0.7397	0.7226
1994-2000 (7)	2003	0.7804	0.7895	0.7715
1995-2001 (7)	2004	0.8177	0.8308	0.8052
1996-2002 (7)	2005	0.7701	0.7824	0.7580
1997-2003 (7)	2006	0.7402	0.7427	0.7380
1994-2001 (8)	2004	0.7976	0.8083	0.7874
1995-2002 (8)	2005	0.8056	0.8221	0.7896
1996-2003 (8)	2006	0.7606	0.7669	0.7544
1994-2002 (9)	2005	0.8005	0.8149	0.7865
1995-2003 (9)	2006	0.7995	0.8103	0.7892
1994-2003 (10)	2006	0.8037	0.8137	0.7941

**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)
1994-1997 (4)	2000	0.0650	0.0553	0.0740
1995-1998 (4)	2001	-0.0209	-0.0311	-0.0117
1996-1999 (4)	2002	-0.0035	0.0078	-0.0145
1997-2000 (4)	2003	-0.2920	-0.2885	-0.2949
1998-2001 (4)	2004	-0.2874	-0.3023	-0.2727
1999-2002 (4)	2005	-0.0963	-0.1049	-0.0889
2000-2003 (4)	2006	0.0647	0.0663	0.0625
1994-1998 (5)	2001	-0.0005	-0.0045	0.0031
1995-1999 (5)	2002	-0.0578	-0.0552	-0.0605
1996-2000 (5)	2003	-0.2287	-0.2356	-0.2212
1997-2001 (5)	2004	-0.2242	-0.2230	-0.2256
1998-2002 (5)	2005	-0.1998	-0.2080	-0.1920
1999-2003 (5)	2006	-0.0597	-0.0671	-0.0532
1994-1999 (6)	2002	-0.0432	-0.0384	-0.0480
1995-2000 (6)	2003	-0.2377	-0.2513	-0.2240
1996-2001 (6)	2004	-0.2137	-0.2184	-0.2089
1997-2002 (6)	2005	-0.1917	-0.1885	-0.1951
1998-2003 (6)	2006	-0.1460	-0.1556	-0.1368
1994-2000 (7)	2003	-0.1966	-0.2069	-0.1863
1995-2001 (7)	2004	-0.2400	-0.2502	-0.2303
1996-2002 (7)	2005	-0.2033	-0.2037	-0.2032
1997-2003 (7)	2006	-0.1551	-0.1586	-0.1522
1994-2001 (8)	2004	-0.2199	-0.2277	-0.2125
1995-2002 (8)	2005	-0.2388	-0.2434	-0.2348
1996-2003 (8)	2006	-0.1755	-0.1828	-0.1686
1994-2002 (9)	2005	-0.2337	-0.2362	-0.2317
1995-2003 (9)	2006	-0.2144	-0.2262	-0.2034
1994-2003 (10)	2006	-0.2186	-0.2296	-0.2083

**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)
	1994	0.3232	0.3279	0.3185
	1995	0.3443	0.3482	0.3404
	1996	0.4001	0.4107	0.3895
	1997	0.4323	0.4366	0.4280
	1998	0.5117	0.5257	0.4979
	1999	0.5889	0.6151	0.5625
	2000	0.7793	0.8494	0.7094
	2001	0.7079	0.7642	0.6516
	2002	0.7727	0.8185	0.7271
	2003	0.8236	0.8760	0.7712
	2004	0.8952	0.9401	0.8502
	2005	0.9076	0.9362	0.8793
	2006	0.9217	0.9639	0.8797

**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)
1994-1997 (4)	2000	0.5474	0.5557	0.5390
1995-1998 (4)	2001	0.6626	0.6816	0.6439
1996-1999 (4)	2002	0.7739	0.8131	0.7345
1997-2000 (4)	2003	1.0812	1.2042	0.9584
1998-2001 (4)	2004	0.9975	1.1160	0.8790
1999-2002 (4)	2005	0.9282	0.9981	0.8589
2000-2003 (4)	2006	0.8598	0.8874	0.8322
1994-1998 (5)	2001	0.6348	0.6518	0.6181
1995-1999 (5)	2002	0.7559	0.7917	0.7200
1996-2000 (5)	2003	1.0000	1.0955	0.9046
1997-2001 (5)	2004	1.0134	1.1277	0.8992
1998-2002 (5)	2005	0.9926	1.0819	0.9035
1999-2003 (5)	2006	0.9659	1.0301	0.9019
1994-1999 (6)	2002	0.7262	0.7574	0.6948
1995-2000 (6)	2003	0.9527	1.0351	0.8704
1996-2001 (6)	2004	0.9876	1.0867	0.8886
1997-2002 (6)	2005	1.0220	1.1176	0.9266
1998-2003 (6)	2006	1.0178	1.0992	0.9365
1994-2000 (7)	2003	0.9048	0.9762	0.8335
1995-2001 (7)	2004	0.9676	1.0580	0.8773
1996-2002 (7)	2005	1.0140	1.1034	0.9248
1997-2003 (7)	2006	1.0484	1.1378	0.9591
1994-2001 (8)	2004	0.9376	1.0193	0.8560
1995-2002 (8)	2005	1.0048	1.0903	0.9195
1996-2003 (8)	2006	1.0484	1.1353	0.9617
1994-2002 (9)	2005	0.9838	1.0640	0.9038
1995-2003 (9)	2006	1.0453	1.1304	0.9602
1994-2003 (10)	2006	1.0302	1.1118	0.9487



**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)
1994-1997 (4)	2000	0.2319	0.2937	0.1704
1995-1998 (4)	2001	0.0453	0.0826	0.0077
1996-1999 (4)	2002	-0.0012	0.0054	-0.0074
1997-2000 (4)	2003	-0.2576	-0.3282	-0.1872
1998-2001 (4)	2004	-0.1023	-0.1759	-0.0288
1999-2002 (4)	2005	-0.0206	-0.0619	0.0205
2000-2003 (4)	2006	0.0619	0.0765	0.0475
1994-1998 (5)	2001	0.0731	0.1124	0.0335
1995-1999 (5)	2002	0.0168	0.0268	0.0071
1996-2000 (5)	2003	-0.1764	-0.2195	-0.1334
1997-2001 (5)	2004	-0.1182	-0.1876	-0.0490
1998-2002 (5)	2005	-0.0850	-0.1457	-0.0241
1999-2003 (5)	2006	-0.0442	-0.0662	-0.0222
1994-1999 (6)	2002	0.0465	0.0611	0.0323
1995-2000 (6)	2003	-0.1291	-0.1591	-0.0992
1996-2001 (6)	2004	-0.0924	-0.1466	-0.0384
1997-2002 (6)	2005	-0.1144	-0.1814	-0.0473
1998-2003 (6)	2006	-0.0961	-0.1353	-0.0568
1994-2000 (7)	2003	-0.0812	-0.1002	-0.0623
1995-2001 (7)	2004	-0.0724	-0.1179	-0.0271
1996-2002 (7)	2005	-0.1064	-0.1672	-0.0455
1997-2003 (7)	2006	-0.1267	-0.1739	-0.0794
1994-2001 (8)	2004	-0.0424	-0.0792	-0.0058
1995-2002 (8)	2005	-0.0972	-0.1541	-0.0402
1996-2003 (8)	2006	-0.1267	-0.1714	-0.0820
1994-2002 (9)	2005	-0.0762	-0.1278	-0.0245
1995-2003 (9)	2006	-0.1236	-0.1665	-0.0805
1994-2003 (10)	2006	-0.1085	-0.1479	-0.0690

**Medical  
Exponential Fit  
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1994-1997 (4)	2000	0.5902	0.5997	0.5806
1995-1998 (4)	2001	0.7386	0.7630	0.7147
1996-1999 (4)	2002	0.8686	0.9203	0.8172
1997-2000 (4)	2003	1.3323	1.5510	1.1285
1998-2001 (4)	2004	1.1226	1.2969	0.9574
1999-2002 (4)	2005	0.9782	1.0603	0.8975
2000-2003 (4)	2006	0.8627	0.8881	0.8391
1994-1998 (5)	2001	0.7041	0.7253	0.6833
1995-1999 (5)	2002	0.8656	0.9157	0.8160
1996-2000 (5)	2003	1.1979	1.3443	1.0562
1997-2001 (5)	2004	1.1935	1.3795	1.0189
1998-2002 (5)	2005	1.0983	1.2202	0.9798
1999-2003 (5)	2006	1.0161	1.0886	0.9444
1994-1999 (6)	2002	0.8287	0.8709	0.7866
1995-2000 (6)	2003	1.1490	1.2746	1.0268
1996-2001 (6)	2004	1.1696	1.3227	1.0226
1997-2002 (6)	2005	1.1871	1.3353	1.0454
1998-2003 (6)	2006	1.1191	1.2259	1.0144
1994-2000 (7)	2003	1.0803	1.1836	0.9787
1995-2001 (7)	2004	1.1688	1.3112	1.0315
1996-2002 (7)	2005	1.1982	1.3350	1.0658
1997-2003 (7)	2006	1.2089	1.3431	1.0794
1994-2001 (8)	2004	1.1336	1.2589	1.0117
1995-2002 (8)	2005	1.2179	1.3539	1.0864
1996-2003 (8)	2006	1.2370	1.3685	1.1092
1994-2002 (9)	2005	1.2017	1.3281	1.0787
1995-2003 (9)	2006	1.2694	1.4048	1.1380
1994-2003 (10)	2006	1.2670	1.3975	1.1400

**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)
1994-1997 (4)	2000	0.1891	0.2497	0.1288
1995-1998 (4)	2001	-0.0307	0.0012	-0.0631
1996-1999 (4)	2002	-0.0959	-0.1018	-0.0901
1997-2000 (4)	2003	-0.5087	-0.6750	-0.3573
1998-2001 (4)	2004	-0.2274	-0.3568	-0.1072
1999-2002 (4)	2005	-0.0706	-0.1241	-0.0182
2000-2003 (4)	2006	0.0590	0.0758	0.0406
1994-1998 (5)	2001	0.0038	0.0389	-0.0317
1995-1999 (5)	2002	-0.0929	-0.0972	-0.0889
1996-2000 (5)	2003	-0.3743	-0.4683	-0.2850
1997-2001 (5)	2004	-0.2983	-0.4394	-0.1687
1998-2002 (5)	2005	-0.1907	-0.2840	-0.1005
1999-2003 (5)	2006	-0.0944	-0.1247	-0.0647
1994-1999 (6)	2002	-0.0560	-0.0524	-0.0595
1995-2000 (6)	2003	-0.3254	-0.3986	-0.2556
1996-2001 (6)	2004	-0.2744	-0.3826	-0.1724
1997-2002 (6)	2005	-0.2795	-0.3991	-0.1661
1998-2003 (6)	2006	-0.1974	-0.2620	-0.1347
1994-2000 (7)	2003	-0.2567	-0.3076	-0.2075
1995-2001 (7)	2004	-0.2736	-0.3711	-0.1813
1996-2002 (7)	2005	-0.2906	-0.3988	-0.1865
1997-2003 (7)	2006	-0.2872	-0.3792	-0.1997
1994-2001 (8)	2004	-0.2384	-0.3188	-0.1615
1995-2002 (8)	2005	-0.3103	-0.4177	-0.2071
1996-2003 (8)	2006	-0.3153	-0.4046	-0.2295
1994-2002 (9)	2005	-0.2941	-0.3919	-0.1994
1995-2003 (9)	2006	-0.3477	-0.4409	-0.2583
1994-2003 (10)	2006	-0.3453	-0.4336	-0.2603