

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 1996 through 2008, 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 (1/1/2009 to 12/1/2011).

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 0.7259 for policy year 2003 (page 6.1). Fitting the severity ratios for policy years 1997 to 2000 using a straight line and projecting that to 2003 yielded a severity ratio of 1.0988 (page 6.2) which overstates our current estimate for 2003 by 0.3729 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)
	1996	0.5507	0.5510	0.5504
	1997	0.6083	0.6142	0.6023
	1998	0.6275	0.6225	0.6323
	1999	0.6743	0.6606	0.6880
	2000	0.8869	0.8978	0.8760
	2001	0.7683	0.7604	0.7760
	2002	0.7708	0.7492	0.7925
	2003	0.7416	0.7259	0.7572
	2004	0.7637	0.7427	0.7846
	2005	0.7513	0.7348	0.7679
	2006	0.7413	0.7308	0.7518
	2007	0.8460	0.8453	0.8467
	2008	0.7754	0.7404	0.8104

Trend # Years = 3

**Indemnity
Linear Fit
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1996-1999 (4)	2002	0.7907	0.7638	0.8175
1997-2000 (4)	2003	1.0964	1.0988	1.0942
1998-2001 (4)	2004	1.0250	1.0282	1.0217
1999-2002 (4)	2005	0.8520	0.8248	0.8792
2000-2003 (4)	2006	0.5969	0.5462	0.6475
2001-2004 (4)	2007	0.7418	0.7102	0.7733
2002-2005 (4)	2008	0.7405	0.7263	0.7547
1996-2000 (5)	2003	1.0387	1.0392	1.0383
1997-2001 (5)	2004	1.0028	0.9950	1.0105
1998-2002 (5)	2005	0.9359	0.9147	0.9572
1999-2003 (5)	2006	0.7776	0.7498	0.8054
2000-2004 (5)	2007	0.6497	0.6029	0.6965
2001-2005 (5)	2008	0.7386	0.7138	0.7636
1996-2001 (6)	2004	0.9957	0.9886	1.0025
1997-2002 (6)	2005	0.9501	0.9258	0.9746
1998-2003 (6)	2006	0.8614	0.8375	0.8854
1999-2004 (6)	2007	0.7697	0.7378	0.8015
2000-2005 (6)	2008	0.6671	0.6284	0.7059
1996-2002 (7)	2005	0.9638	0.9427	0.9848
1997-2003 (7)	2006	0.8926	0.8662	0.9191
1998-2004 (7)	2007	0.8391	0.8104	0.8678
1999-2005 (7)	2008	0.7563	0.7269	0.7856
1996-2003 (8)	2006	0.9190	0.8950	0.9429
1997-2004 (8)	2007	0.8717	0.8412	0.9022
1998-2005 (8)	2008	0.8162	0.7886	0.8438
1996-2004 (9)	2007	0.9007	0.8725	0.9289
1997-2005 (9)	2008	0.8491	0.8194	0.8789
1996-2005 (10)	2008	0.8795	0.8513	0.9078

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)
1996-1999 (4)	2002	-0.0199	-0.0146	-0.0250
1997-2000 (4)	2003	-0.3548	-0.3729	-0.3370
1998-2001 (4)	2004	-0.2613	-0.2855	-0.2371
1999-2002 (4)	2005	-0.1007	-0.0900	-0.1113
2000-2003 (4)	2006	0.1444	0.1846	0.1043
2001-2004 (4)	2007	0.1043	0.1351	0.0734
2002-2005 (4)	2008	0.0349	0.0141	0.0557
1996-2000 (5)	2003	-0.2971	-0.3133	-0.2811
1997-2001 (5)	2004	-0.2391	-0.2523	-0.2259
1998-2002 (5)	2005	-0.1846	-0.1799	-0.1893
1999-2003 (5)	2006	-0.0363	-0.0190	-0.0536
2000-2004 (5)	2007	0.1963	0.2425	0.1502
2001-2005 (5)	2008	0.0368	0.0266	0.0468
1996-2001 (6)	2004	-0.2320	-0.2459	-0.2179
1997-2002 (6)	2005	-0.1988	-0.1910	-0.2067
1998-2003 (6)	2006	-0.1201	-0.1067	-0.1336
1999-2004 (6)	2007	0.0763	0.1075	0.0452
2000-2005 (6)	2008	0.1083	0.1120	0.1045
1996-2002 (7)	2005	-0.2125	-0.2079	-0.2169
1997-2003 (7)	2006	-0.1513	-0.1354	-0.1673
1998-2004 (7)	2007	0.0069	0.0349	-0.0211
1999-2005 (7)	2008	0.0192	0.0135	0.0248
1996-2003 (8)	2006	-0.1777	-0.1642	-0.1911
1997-2004 (8)	2007	-0.0257	0.0041	-0.0555
1998-2005 (8)	2008	-0.0408	-0.0482	-0.0334
1996-2004 (9)	2007	-0.0547	-0.0272	-0.0822
1997-2005 (9)	2008	-0.0737	-0.0790	-0.0685
1996-2005 (10)	2008	-0.1041	-0.1109	-0.0974

**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)
1996-1999 (4)	2002	0.8178	0.7850	0.8513
1997-2000 (4)	2003	1.1878	1.1832	1.1922
1998-2001 (4)	2004	1.0895	1.0948	1.0839
1999-2002 (4)	2005	0.8663	0.8385	0.8942
2000-2003 (4)	2006	0.6214	0.5820	0.6627
2001-2004 (4)	2007	0.7419	0.7110	0.7731
2002-2005 (4)	2008	0.7408	0.7265	0.7551
1996-2000 (5)	2003	1.1200	1.1148	1.1246
1997-2001 (5)	2004	1.0601	1.0461	1.0739
1998-2002 (5)	2005	0.9706	0.9453	0.9958
1999-2003 (5)	2006	0.7847	0.7578	0.8119
2000-2004 (5)	2007	0.6638	0.6247	0.7045
2001-2005 (5)	2008	0.7388	0.7144	0.7636
1996-2001 (6)	2004	1.0630	1.0503	1.0754
1997-2002 (6)	2005	0.9910	0.9585	1.0241
1998-2003 (6)	2006	0.8792	0.8528	0.9058
1999-2004 (6)	2007	0.7759	0.7451	0.8070
2000-2005 (6)	2008	0.6777	0.6443	0.7122
1996-2002 (7)	2005	1.0195	0.9901	1.0490
1997-2003 (7)	2006	0.9184	0.8859	0.9515
1998-2004 (7)	2007	0.8529	0.8221	0.8840
1999-2005 (7)	2008	0.7615	0.7334	0.7900
1996-2003 (8)	2006	0.9598	0.9287	0.9911
1997-2004 (8)	2007	0.8928	0.8570	0.9292
1998-2005 (8)	2008	0.8266	0.7978	0.8559
1996-2004 (9)	2007	0.9355	0.9005	0.9710
1997-2005 (9)	2008	0.8657	0.8320	0.9002
1996-2005 (10)	2008	0.9084	0.8745	0.9428

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)
1996-1999 (4)	2002	-0.0470	-0.0358	-0.0588
1997-2000 (4)	2003	-0.4462	-0.4573	-0.4350
1998-2001 (4)	2004	-0.3258	-0.3521	-0.2993
1999-2002 (4)	2005	-0.1150	-0.1037	-0.1263
2000-2003 (4)	2006	0.1199	0.1488	0.0891
2001-2004 (4)	2007	0.1041	0.1343	0.0736
2002-2005 (4)	2008	0.0346	0.0139	0.0553
1996-2000 (5)	2003	-0.3784	-0.3889	-0.3674
1997-2001 (5)	2004	-0.2964	-0.3034	-0.2893
1998-2002 (5)	2005	-0.2193	-0.2105	-0.2279
1999-2003 (5)	2006	-0.0434	-0.0270	-0.0601
2000-2004 (5)	2007	0.1822	0.2206	0.1422
2001-2005 (5)	2008	0.0366	0.0260	0.0468
1996-2001 (6)	2004	-0.2993	-0.3076	-0.2908
1997-2002 (6)	2005	-0.2397	-0.2237	-0.2562
1998-2003 (6)	2006	-0.1379	-0.1220	-0.1540
1999-2004 (6)	2007	0.0701	0.1002	0.0397
2000-2005 (6)	2008	0.0977	0.0961	0.0982
1996-2002 (7)	2005	-0.2682	-0.2553	-0.2811
1997-2003 (7)	2006	-0.1771	-0.1551	-0.1997
1998-2004 (7)	2007	-0.0069	0.0232	-0.0373
1999-2005 (7)	2008	0.0139	0.0070	0.0204
1996-2003 (8)	2006	-0.2185	-0.1979	-0.2393
1997-2004 (8)	2007	-0.0468	-0.0117	-0.0825
1998-2005 (8)	2008	-0.0512	-0.0574	-0.0455
1996-2004 (9)	2007	-0.0895	-0.0552	-0.1243
1997-2005 (9)	2008	-0.0903	-0.0916	-0.0898
1996-2005 (10)	2008	-0.1330	-0.1341	-0.1324

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)
	1996	0.5613	0.5825	0.5401
	1997	0.5710	0.5857	0.5562
	1998	0.6897	0.6921	0.6872
	1999	0.7738	0.7898	0.7576
	2000	1.0209	1.0684	0.9734
	2001	0.9255	0.9640	0.8870
	2002	1.0092	1.0397	0.9786
	2003	1.0393	1.0767	1.0020
	2004	1.2009	1.2319	1.1700
	2005	1.1959	1.2230	1.1688
	2006	1.1873	1.1994	1.1755
	2007	1.4576	1.5070	1.4080
	2008	1.5439	1.5658	1.5220

**Medical
Linear Fit
Trended Loss Ratios**

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1996-1999 (4)	2002	0.9892	0.9903	0.9879
1997-2000 (4)	2003	1.4091	1.4796	1.3385
1998-2001 (4)	2004	1.2820	1.3710	1.1931
1999-2002 (4)	2005	1.2072	1.2559	1.1586
2000-2003 (4)	2006	1.0612	1.0825	1.0401
2001-2004 (4)	2007	1.4291	1.4564	1.4020
2002-2005 (4)	2008	1.4361	1.4601	1.4122
1996-2000 (5)	2003	1.2843	1.3317	1.2369
1997-2001 (5)	2004	1.3163	1.3865	1.2462
1998-2002 (5)	2005	1.2792	1.3455	1.2129
1999-2003 (5)	2006	1.2134	1.2603	1.1667
2000-2004 (5)	2007	1.2761	1.2960	1.2563
2001-2005 (5)	2008	1.4404	1.4622	1.4188
1996-2001 (6)	2004	1.2685	1.3231	1.2139
1997-2002 (6)	2005	1.3260	1.3853	1.2667
1998-2003 (6)	2006	1.2804	1.3420	1.2189
1999-2004 (6)	2007	1.3523	1.3916	1.3133
2000-2005 (6)	2008	1.3373	1.3542	1.3206
1996-2002 (7)	2005	1.3039	1.3541	1.2536
1997-2003 (7)	2006	1.3318	1.3900	1.2738
1998-2004 (7)	2007	1.3912	1.4442	1.3385
1999-2005 (7)	2008	1.3965	1.4289	1.3643
1996-2003 (8)	2006	1.3262	1.3779	1.2745
1997-2004 (8)	2007	1.4275	1.4798	1.3754
1998-2005 (8)	2008	1.4321	1.4771	1.3872
1996-2004 (9)	2007	1.4204	1.4686	1.3722
1997-2005 (9)	2008	1.4674	1.5134	1.4215
1996-2005 (10)	2008	1.4660	1.5098	1.4223

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)
1996-1999 (4)	2002	0.0200	0.0494	-0.0092
1997-2000 (4)	2003	-0.3698	-0.4029	-0.3365
1998-2001 (4)	2004	-0.0811	-0.1391	-0.0231
1999-2002 (4)	2005	-0.0113	-0.0329	0.0102
2000-2003 (4)	2006	0.1261	0.1169	0.1354
2001-2004 (4)	2007	0.0285	0.0506	0.0060
2002-2005 (4)	2008	0.1078	0.1057	0.1098
1996-2000 (5)	2003	-0.2450	-0.2550	-0.2349
1997-2001 (5)	2004	-0.1154	-0.1546	-0.0762
1998-2002 (5)	2005	-0.0833	-0.1225	-0.0441
1999-2003 (5)	2006	-0.0261	-0.0609	0.0088
2000-2004 (5)	2007	0.1815	0.2110	0.1517
2001-2005 (5)	2008	0.1035	0.1036	0.1032
1996-2001 (6)	2004	-0.0676	-0.0912	-0.0439
1997-2002 (6)	2005	-0.1301	-0.1623	-0.0979
1998-2003 (6)	2006	-0.0931	-0.1426	-0.0434
1999-2004 (6)	2007	0.1053	0.1154	0.0947
2000-2005 (6)	2008	0.2066	0.2116	0.2014
1996-2002 (7)	2005	-0.1080	-0.1311	-0.0848
1997-2003 (7)	2006	-0.1445	-0.1906	-0.0983
1998-2004 (7)	2007	0.0664	0.0628	0.0695
1999-2005 (7)	2008	0.1474	0.1369	0.1577
1996-2003 (8)	2006	-0.1389	-0.1785	-0.0990
1997-2004 (8)	2007	0.0301	0.0272	0.0326
1998-2005 (8)	2008	0.1118	0.0887	0.1348
1996-2004 (9)	2007	0.0372	0.0384	0.0358
1997-2005 (9)	2008	0.0765	0.0524	0.1005
1996-2005 (10)	2008	0.0779	0.0560	0.0997

**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)
1996-1999 (4)	2002	1.0800	1.0685	1.0922
1997-2000 (4)	2003	1.7234	1.8271	1.6207
1998-2001 (4)	2004	1.4198	1.5522	1.2936
1999-2002 (4)	2005	1.2692	1.3271	1.2119
2000-2003 (4)	2006	1.0627	1.0833	1.0426
2001-2004 (4)	2007	1.4966	1.5189	1.4753
2002-2005 (4)	2008	1.4868	1.5075	1.4665
1996-2000 (5)	2003	1.4935	1.5425	1.4435
1997-2001 (5)	2004	1.5373	1.6380	1.4384
1998-2002 (5)	2005	1.3980	1.4911	1.3075
1999-2003 (5)	2006	1.2663	1.3199	1.2134
2000-2004 (5)	2007	1.2907	1.3072	1.2751
2001-2005 (5)	2008	1.5064	1.5219	1.4917
1996-2001 (6)	2004	1.4640	1.5295	1.3983
1997-2002 (6)	2005	1.5276	1.6099	1.4463
1998-2003 (6)	2006	1.3852	1.4677	1.3045
1999-2004 (6)	2007	1.4242	1.4681	1.3809
2000-2005 (6)	2008	1.3642	1.3762	1.3531
1996-2002 (7)	2005	1.5055	1.5666	1.4443
1997-2003 (7)	2006	1.5151	1.5938	1.4374
1998-2004 (7)	2007	1.5153	1.5864	1.4455
1999-2005 (7)	2008	1.4742	1.5083	1.4405
1996-2003 (8)	2006	1.5249	1.5888	1.4612
1997-2004 (8)	2007	1.6301	1.7007	1.5602
1998-2005 (8)	2008	1.5599	1.6186	1.5021
1996-2004 (9)	2007	1.6444	1.7044	1.5848
1997-2005 (9)	2008	1.6716	1.7321	1.6116
1996-2005 (10)	2008	1.6983	1.7516	1.6453

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)
1996-1999 (4)	2002	-0.0708	-0.0288	-0.1136
1997-2000 (4)	2003	-0.6841	-0.7504	-0.6187
1998-2001 (4)	2004	-0.2189	-0.3203	-0.1236
1999-2002 (4)	2005	-0.0733	-0.1041	-0.0431
2000-2003 (4)	2006	0.1246	0.1161	0.1329
2001-2004 (4)	2007	-0.0390	-0.0119	-0.0673
2002-2005 (4)	2008	0.0571	0.0583	0.0555
1996-2000 (5)	2003	-0.4542	-0.4658	-0.4415
1997-2001 (5)	2004	-0.3364	-0.4061	-0.2684
1998-2002 (5)	2005	-0.2021	-0.2681	-0.1387
1999-2003 (5)	2006	-0.0790	-0.1205	-0.0379
2000-2004 (5)	2007	0.1669	0.1998	0.1329
2001-2005 (5)	2008	0.0375	0.0439	0.0303
1996-2001 (6)	2004	-0.2631	-0.2976	-0.2283
1997-2002 (6)	2005	-0.3317	-0.3869	-0.2775
1998-2003 (6)	2006	-0.1979	-0.2683	-0.1290
1999-2004 (6)	2007	0.0334	0.0389	0.0271
2000-2005 (6)	2008	0.1797	0.1896	0.1689
1996-2002 (7)	2005	-0.3096	-0.3436	-0.2755
1997-2003 (7)	2006	-0.3278	-0.3944	-0.2619
1998-2004 (7)	2007	-0.0577	-0.0794	-0.0375
1999-2005 (7)	2008	0.0697	0.0575	0.0815
1996-2003 (8)	2006	-0.3376	-0.3894	-0.2857
1997-2004 (8)	2007	-0.1725	-0.1937	-0.1522
1998-2005 (8)	2008	-0.0160	-0.0528	0.0199
1996-2004 (9)	2007	-0.1868	-0.1974	-0.1768
1997-2005 (9)	2008	-0.1277	-0.1663	-0.0896
1996-2005 (10)	2008	-0.1544	-0.1858	-0.1233