PENNSYLVANIA COMPENSATION RATING BUREAU

Retrospective Test of Trend Projections for Severity Ratios

Attached is a retrospective test of the predictive accuracy of various trend procedures. Please note that instead of using ultimate loss ratios, as in Exhibit 11a, Exhibit 11b uses ultimate severity ratios, i.e., ultimate loss ratios adjusted by dividing out the frequency component. Please note that our analysis is limited to Policy Years 1993 through 2004, the years shown on Exhibit 6, page 6.

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 severity ratio three years hence, were used. Our current review trends policy year 2004 3.25 years, policy year 2003 4.25 years, and policy year 2002 5.25 years. An average of those three values is then calculated.

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

As an illustration, the incurred loss development approach generated an indemnity severity ratio of 0.8476 for policy year 1999. Fitting the loss ratios for policy years 1993 to 1996 using a straight line and projecting that to 1999 yielded a severity ratio of 0.6733, which understates our current estimate for 1999 by 0.1743 points.

Indemnity
Actual Ultimate Severity Ratios
Including Average of Paid and Incurred

INDEMNITY

Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
1993	0.7042	0.7009	0.7075
1994	0.7597	0.7508	0.7687
1995	0.7672	0.7498	0.7847
1996	0.6912	0.6685	0.7141
1997	0.7454	0.7076	0.7832
1998	0.7803	0.7424	0.8183
1999	0.8967	0.8476	0.9459
2000	1.0009	0.9459	1.0561
2001	1.0206	0.9452	1.0962
2002	1.0539	0.9744	1.1334
2003	1.0586	0.9565	1.1608
2004	1.1701	1.0855	1.2546

Trend # Years =   3

11b.1

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)
93-96 (4)	1999	0.7164	0.6733	0.7599
94-97 (4)	2000	0.6874	0.6243	0.7505
95-98 (4)	2001	0.7881	0.7247	0.8515
96-99 (4)	2002	1.0715	0.9990	1.1441
97-00 (4)	2003	1.2531	1.1799	1.3267
98-01 (4)	2004	1.2959	1.1883	1.4039
93-97 (5)	2000	0.7405	0.6811	0.8000
94-98 (5)	2001	0.7585	0.6943	0.8227
95-99 (5)	2002	0.9502	0.8779	1.0225
96-00 (5)	2003	1.2083	1.1298	1.2869
97-01 (5)	2004	1.2743	1.1771	1.3718
93-98 (6)	2001	0.7824	0.7195	0.8455
94-99 (6)	2002	0.8958	0.8232	0.9684
95-00 (6)	2003	1.0996	1.0209	1.1784
96-01 (6)	2004	1.2534	1.1558	1.3512
93-99 (7)	2002	0.8914	0.8199	0.9631
94-00 (7)	2003	1.0356	0.9564	1.1149
95-01 (7)	2004	1.1712	1.0755	1.2672
93-00 (8)	2003	1.0142	0.9357	1.0928
94-01 (8)	2004	1.1149	1.0202	1.2098
93-01 (9)	2004	1.0912	0.9980	1.1845

11b.2

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)
93-96 (4)	1999	0.1803	0.1743	0.1860
94-97 (4)	2000	0.3135	0.3216	0.3056
95-98 (4)	2001	0.2325	0.2205	0.2447
96-99 (4)	2002	-0.0176	-0.0246	-0.0107
97-00 (4)	2003	-0.1945	-0.2234	-0.1659
98-01 (4)	2004	-0.1258	-0.1028	-0.1493
93-97 (5)	2000	0.2604	0.2648	0.2561
94-98 (5)	2001	0.2621	0.2509	0.2736
95-99 (5)	2002	0.1037	0.0965	0.1109
96-00 (5)	2003	-0.1497	-0.1733	-0.1261
97-01 (5)	2004	-0.1042	-0.0916	-0.1172
93-98 (6)	2001	0.2382	0.2257	0.2507
94-99 (6)	2002	0.1581	0.1512	0.1650
95-00 (6)	2003	-0.0410	-0.0644	-0.0176
96-01 (6)	2004	-0.0833	-0.0703	-0.0966
93-99 (7)	2002	0.1625	0.1545	0.1703
94-00 (7)	2003	0.0230	0.0001	0.0459
95-01 (7)	2004	-0.0011	0.0100	-0.0126
93-00 (8)	2003	0.0444	0.0208	0.0680
94-01 (8)	2004	0.0552	0.0653	0.0448
93-01 (9)	2004	0.0789	0.0875	0.0701

11b.3

Indemnity
Exponential Fit
Trended Loss Ratios

Years Used (# Yrs)	3 Yr Trend To	Severity Ratio (Incur)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
93-96 (4)	1999	0.7148	0.6719	0.7594
94-97 (4)	2000	0.6884	0.6297	0.7491
95-98 (4)	2001	0.7888	0.7251	0.8540
96-99 (4)	2002	1.1240	1.0399	1.2092
97-00 (4)	2003	1.3471	1.2653	1.4295
98-01 (4)	2004	1.3881	1.2606	1.5172
93-97 (5)	2000	0.7400	0.6810	0.8011
94-98 (5)	2001	0.7574	0.6946	0.8221
95-99 (5)	2002	0.9604	0.8826	1.0398
96-00 (5)	2003	1.2953	1.2019	1.3898
97-01 (5)	2004	1.3672	1.2541	1.4814
93-98 (6)	2001	0.7827	0.7188	0.8488
94-99 (6)	2002	0.8959	0.8202	0.9738
95-00 (6)	2003	1.1329	1.0437	1.2238
96-01 (6)	2004	1.3505	1.2327	1.4701
93-99 (7)	2002	0.8937	0.8179	0.9722
94-00 (7)	2003	1.0485	0.9611	1.1382
95-01 (7)	2004	1.2228	1.1119	1.3361
93-00 (8)	2003	1.0260	0.9387	1.1161
94-01 (8)	2004	1.1439	1.0368	1.2539
93-01 (9)	2004	1.1166	1.0109	1.2258

11b.4

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)
93-96 (4)	1999	0.1819	0.1757	0.1865
94-97 (4)	2000	0.3125	0.3162	0.3070
95-98 (4)	2001	0.2318	0.2201	0.2422
96-99 (4)	2002	-0.0701	-0.0655	-0.0758
97-00 (4)	2003	-0.2885	-0.3088	-0.2687
98-01 (4)	2004	-0.2180	-0.1751	-0.2626
93-97 (5)	2000	0.2609	0.2649	0.2550
94-98 (5)	2001	0.2632	0.2506	0.2741
95-99 (5)	2002	0.0935	0.0918	0.0936
96-00 (5)	2003	-0.2367	-0.2454	-0.2290
97-01 (5)	2004	-0.1971	-0.1686	-0.2268
93-98 (6)	2001	0.2379	0.2264	0.2474
94-99 (6)	2002	0.1580	0.1542	0.1596
95-00 (6)	2003	-0.0743	-0.0872	-0.0630
96-01 (6)	2004	-0.1804	-0.1472	-0.2155
93-99 (7)	2002	0.1602	0.1565	0.1612
94-00 (7)	2003	0.0101	-0.0046	0.0226
95-01 (7)	2004	-0.0527	-0.0264	-0.0815
93-00 (8)	2003	0.0326	0.0178	0.0447
94-01 (8)	2004	0.0262	0.0487	0.0007
93-01 (9)	2004	0.0535	0.0746	0.0288

11b.5

Medical
Actual Ultimate Severity Ratios
Including Average of Paid and Incurred

MEDICAL	Policy Year	Severity Ratio (Avg Pd & Inc)	Severity Ratio (Incur)	Severity Ratio (Pd-20)
	1993	0.5076	0.4972	0.5180
	1994	0.5586	0.5498	0.5673
	1995	0.6137	0.6062	0.6213
	1996	0.6315	0.6308	0.6320
	1997	0.6964	0.6919	0.7009
	1998	0.7706	0.7808	0.7606
	1999	0.8467	0.8576	0.8360
	2000	0.9360	0.9503	0.9217
	2001	0.9359	0.9305	0.9414
	2002	0.9942	0.9850	1.0034
	2003	1.0755	1.0662	1.0846
	2004	1.2435	1.2535	1.2336

Trend # Years =   3

11b.6

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)
93-96 (4)	1999	0.7699	0.7767	0.7629
94-97 (4)	2000	0.8191	0.8226	0.8156
95-98 (4)	2001	0.9191	0.9406	0.8978
96-99 (4)	2002	1.0602	1.0865	1.0346
97-00 (4)	2003	1.1701	1.2036	1.1368
98-01 (4)	2004	1.1356	1.1236	1.1476
93-97 (5)	2000	0.8268	0.8304	0.8232
94-98 (5)	2001	0.9075	0.9258	0.8895
95-99 (5)	2002	1.0143	1.0399	0.9892
96-00 (5)	2003	1.1559	1.1846	1.1275
97-01 (5)	2004	1.1593	1.1656	1.1532
93-98 (6)	2001	0.9041	0.9198	0.8886
94-99 (6)	2002	0.9968	1.0199	0.9740
95-00 (6)	2003	1.1155	1.1442	1.0870
96-01 (6)	2004	1.1669	1.1763	1.1578
93-99 (7)	2002	0.9873	1.0082	0.9666
94-00 (7)	2003	1.0942	1.1213	1.0674
95-01 (7)	2004	1.1457	1.1592	1.1323
93-00 (8)	2003	1.0801	1.1054	1.0550
94-01 (8)	2004	1.1334	1.1486	1.1185
93-01 (9)	2004	1.1244	1.1402	1.1089

11b.7

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)
93-96 (4)	1999	0.0768	0.0809	0.0731
94-97 (4)	2000	0.1169	0.1277	0.1062
95-98 (4)	2001	0.0168	-0.0101	0.0436
96-99 (4)	2002	-0.0660	-0.1015	-0.0312
97-00 (4)	2003	-0.0946	-0.1374	-0.0522
98-01 (4)	2004	0.1079	0.1299	0.0860
93-97 (5)	2000	0.1092	0.1199	0.0986
94-98 (5)	2001	0.0284	0.0047	0.0519
95-99 (5)	2002	-0.0201	-0.0549	0.0142
96-00 (5)	2003	-0.0804	-0.1184	-0.0429
97-01 (5)	2004	0.0842	0.0879	0.0804
93-98 (6)	2001	0.0318	0.0107	0.0528
94-99 (6)	2002	-0.0026	-0.0349	0.0294
95-00 (6)	2003	-0.0400	-0.0780	-0.0024
96-01 (6)	2004	0.0766	0.0772	0.0758
93-99 (7)	2002	0.0069	-0.0232	0.0368
94-00 (7)	2003	-0.0187	-0.0551	0.0172
95-01 (7)	2004	0.0978	0.0943	0.1013
93-00 (8)	2003	-0.0046	-0.0392	0.0296
94-01 (8)	2004	0.1101	0.1049	0.1151
93-01 (9)	2004	0.1191	0.1133	0.1247

11b.8

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)
93-96 (4)	1999	0.8066	0.8193	0.7942
94-97 (4)	2000	0.8500	0.8575	0.8427
95-98 (4)	2001	0.9596	0.9891	0.9312
96-99 (4)	2002	1.1381	1.1753	1.1026
97-00 (4)	2003	1.2559	1.3041	1.2090
98-01 (4)	2004	1.1825	1.1641	1.2010
93-97 (5)	2000	0.8724	0.8815	0.8637
94-98 (5)	2001	0.9554	0.9820	0.9299
95-99 (5)	2002	1.0768	1.1134	1.0417
96-00 (5)	2003	1.2565	1.2981	1.2162
97-01 (5)	2004	1.2319	1.2411	1.2227
93-98 (6)	2001	0.9653	0.9903	0.9412
94-99 (6)	2002	1.0650	1.0997	1.0318
95-00 (6)	2003	1.2036	1.2462	1.1624
96-01 (6)	2004	1.2626	1.2767	1.2488
93-99 (7)	2002	1.0679	1.1014	1.0359
94-00 (7)	2003	1.1873	1.2290	1.1471
95-01 (7)	2004	1.2396	1.2615	1.2182
93-00 (8)	2003	1.1852	1.2263	1.1457
94-01 (8)	2004	1.2366	1.2625	1.2113
93-01 (9)	2004	1.2421	1.2710	1.2141

11b.9

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)
93-96 (4)	1999	0.0401	0.0383	0.0418
94-97 (4)	2000	0.0860	0.0928	0.0790
95-98 (4)	2001	-0.0237	-0.0586	0.0102
96-99 (4)	2002	-0.1439	-0.1903	-0.0992
97-00 (4)	2003	-0.1804	-0.2379	-0.1244
98-01 (4)	2004	0.0610	0.0894	0.0326
93-97 (5)	2000	0.0636	0.0688	0.0580
94-98 (5)	2001	-0.0195	-0.0515	0.0115
95-99 (5)	2002	-0.0826	-0.1284	-0.0383
96-00 (5)	2003	-0.1810	-0.2319	-0.1316
97-01 (5)	2004	0.0116	0.0124	0.0109
93-98 (6)	2001	-0.0294	-0.0598	0.0002
94-99 (6)	2002	-0.0708	-0.1147	-0.0284
95-00 (6)	2003	-0.1281	-0.1800	-0.0778
96-01 (6)	2004	-0.0191	-0.0232	-0.0152
93-99 (7)	2002	-0.0737	-0.1164	-0.0325
94-00 (7)	2003	-0.1118	-0.1628	-0.0625
95-01 (7)	2004	0.0039	-0.0080	0.0154
93-00 (8)	2003	-0.1097	-0.1601	-0.0611
94-01 (8)	2004	0.0069	-0.0090	0.0223
93-01 (9)	2004	0.0014	-0.0175	0.0195

11b.10